



Environmental Baseline Survey

NRP South Housing Area Final

Prepared for
NASA Ames Research Center

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Acronyms and Abbreviations

µg/L	micrograms per liter
ACM	asbestos-containing materials
AECOM	AECOM Technical Services, Inc.
AHERA	Asbestos Hazard Emergency Response Act
ARC	Ames Research Center
AST	aboveground storage tank
BAAQMD	Bay Area Air Quality Management District
BOHMP	Burrowing Owl Habitat Management Plan
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene and xylene
CAL OSHA	California Occupational Health and Safety
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cis-1,2-DCE	cis-1,2 –dichloroethene
CP	Closure Plan
DoD	Department of Defense
EBS	Environmental Baseline Survey
ECP	environmental condition of property
EIMP	Environmental Issues Management Plan
ESA	Environmental Site Assessment
ESD	Explanation of Significant Differences
GHG	greenhouse gas
IC	institutional control
ICRMP	Integrated Cultural Resources Management Plan
IGP	Industrial General Permit
LBP	lead-based paint
MEW Companies	Middlefield Road, Ellis Street, and Whisman Road Companies
MEW RGRP	MEW Regional Groundwater Remediation Program
mg/cm ²	milligram per square centimeter
mg/kg	milligrams per kilogram
MFA Moffett Field	Moffett Federal Airfield
NADP	NASA Ames Development Plan
NASA	National Aeronautics and Space Administration
NASA AMES	NASA Ames Research Center
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NRP	NASA Research Park
OSHA	Occupational Safety & Health Administration
pCi/L	picoCuries per liter
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PEIS	Programmatic Environmental Impact Statement
ppm	parts per million

PRG	preliminary remediation goal
RBSL	risk-based screening level
ROD	Record of Decision
SCVWD	Santa Clara Valley Water District
SOP	standard operating procedure
SWPPP	Storm Water Pollution Prevention Plan
TCE	trichloroethene
TPH-HO	total petroleum hydrocarbons as hydraulic oil
TPH-MO	total petroleum hydrocarbons as motor oil
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
VC	vinyl chloride
VOC	volatile organic compound

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1. Introduction

1.1 Purpose of the Environmental Baseline Survey

This Environmental Baseline Survey (EBS) report documents the environmental conditions on National Aeronautics and Space Administration (NASA) Ames Research Center (NASA Ames) owned land parcels in the NASA Research Park (NRP) South area, which includes land that is under consideration for proposed new housing development. In this report, the NRP South parcels are referred to as “the Study Area.”

The purpose of the EBS is to: 1) summarize the known existing environmental condition of the Study Area in a manner that is easy to use by other parties; and 2) evaluate the potential constraints that the existing conditions may have on future uses. To the extent that the information was available to the authors, this EBS addresses the following:

- Status of the site investigations and remediation;
- Nature and extent of known contamination, if any;
- Hazardous materials and waste management;
- Underground storage tanks (USTs) and aboveground storage tanks (ASTs);
- Status of building surveys for asbestos, lead-based paint (LBP), and radon; and
- Other information pertaining to environmental conditions on the parcels.

This report focuses on identifying and documenting environmental site characterization and remediation activities, and the presence or likely presence of hazardous substances and/or hazardous waste on a portion of real property considered for reuse. This report addresses hazardous substances or wastes, including certain substances not usually regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and other substances such as petroleum products, asbestos, LBP, and polychlorinated biphenyls (PCBs) in structures to the extent that relevant information is available. This report considers soil and groundwater contamination, and describes potential public health and safety issues (e.g., those associated with the soil or groundwater contamination or the condition of buildings) that may affect NASA’s ability or decision to redevelop such property. This report does not encompass a complete site characterization because it is based on existing, available information. In addition, no confirmation/field verification has been conducted.

1.2 Limitations

The EBS was conducted at the request of NASA Ames for its use. No information in this report should be used by other agencies without the consent of NASA. All environmental data that were reviewed for this report were collected by, and were limited to, reviewing historical and compiled information and interviews with NASA personnel. No samples were taken to support current environmental information or provide an understanding of environmental conditions.

This report discusses reasonably available information per building, by parcel. The parcel designations recently have been re-classified, based on current and planned leasing activities, and therefore will not align with previous reports.

AECOM services are performed in a professional manner, with the interests of our clients in mind. AECOM's objective is to provide our services with care, exercising the customary thoroughness and competence of consulting professionals in the relevant disciplines, in accordance with the standard for professional services at the time and location those services are rendered. It is important to recognize

that even the most comprehensive scope of services may fail to detect environmental liabilities at a particular site. Therefore, AECOM cannot act as insurers and cannot “certify” that a site is free of environmental contamination, and no expressed or implied representation or warranty is included or intended in our reports, except that our services were performed, within the limits prescribed by our client, with the customary thoroughness and competence of our profession.

1.3 Document Organization

This report is presented in 16 chapters. All associated and applicable supporting documents, figures, and maps are found herein or in the attached appendices. Combined, this document represents all collected history and current environmental status of Parcels 1 through 6, 6a, 10, and 11.

This report describes the methodology used to make findings by parcel (Chapter 2), findings for certain topics that are consistent for all parcels and/or could not be separated by parcel based on the information available (Chapter 3), findings for each of the surveyed parcels (Chapters 4 through 12), findings for adjacent properties (Chapter 13), any compliance issues (Chapter 14), and conclusions for future use of the surveyed parcels (Chapter 15). References for all documents and personal communications cited in this report are listed in Chapter 16.

1.4 Survey Area

This report focuses on the NRP South parcels of NASA Ames, where housing may be developed in the future. The general area covered is the area west of Moffett Federal Airfield (Moffett Field), south of Shenandoah Plaza, east of Wescoat Village, and north of Highway 101, as shown in **Figure 1-1** (area within the red-dashed line). The Study Area is bounded by Wescoat Road to the north, Highway 101 to the south, Cody and Macon Roads to the east, and Wescoat housing to the west. This report discusses Parcels 1, 2, 3, 4, 5, 6, 6a, 10, and 11. The numbers and boundaries of these parcels were developed for current and planned leasing activities, and therefore do not correspond to older parcel numbers/boundaries that were used in the 2001 EBS documents for this general area. The 2001 EBS document for Parcel 5 generally covers new Parcels 1, 2, 3, 4, 5, 6, and 6a. In the 2001 EBS document for Parcels 2 through 4, 6, and 7, Parcel 6 generally equates to new Parcel 11 and Parcel 4 covers a small portion of the new Parcel 10.

The new parcel boundaries sometimes split buildings on the map; however, to avoid redundancy in this report, buildings have been assigned to specific parcels and do not overlap parcels. The specific buildings in each new parcel are shown in **Table 1-1**.

Table 1-1 Buildings by Parcel

Parcel	Buildings within the Parcel
Parcel 1	148, 149, 150, 151, 380, 583A, 583B, 583C
Parcel 2	082, 111, 146, 161, 184, 343, 432, 459, 512A, 512B, 512C, 544, 547B, 547C, 547D, 572, 574, 585, 945, 950, 951, 958, 966, 967, 992
Parcel 3	107, 108, 109, 555
Parcel 4	152, 153, 154, 155, 156, 533, 534, 590, 964, 965
Parcel 5	104, 503, 526, 529, 547E, 554, 556, 596, 944
Parcel 6	543
Parcel 6a	476
Parcel 10	431, 582
Parcel 11	MF 1025A

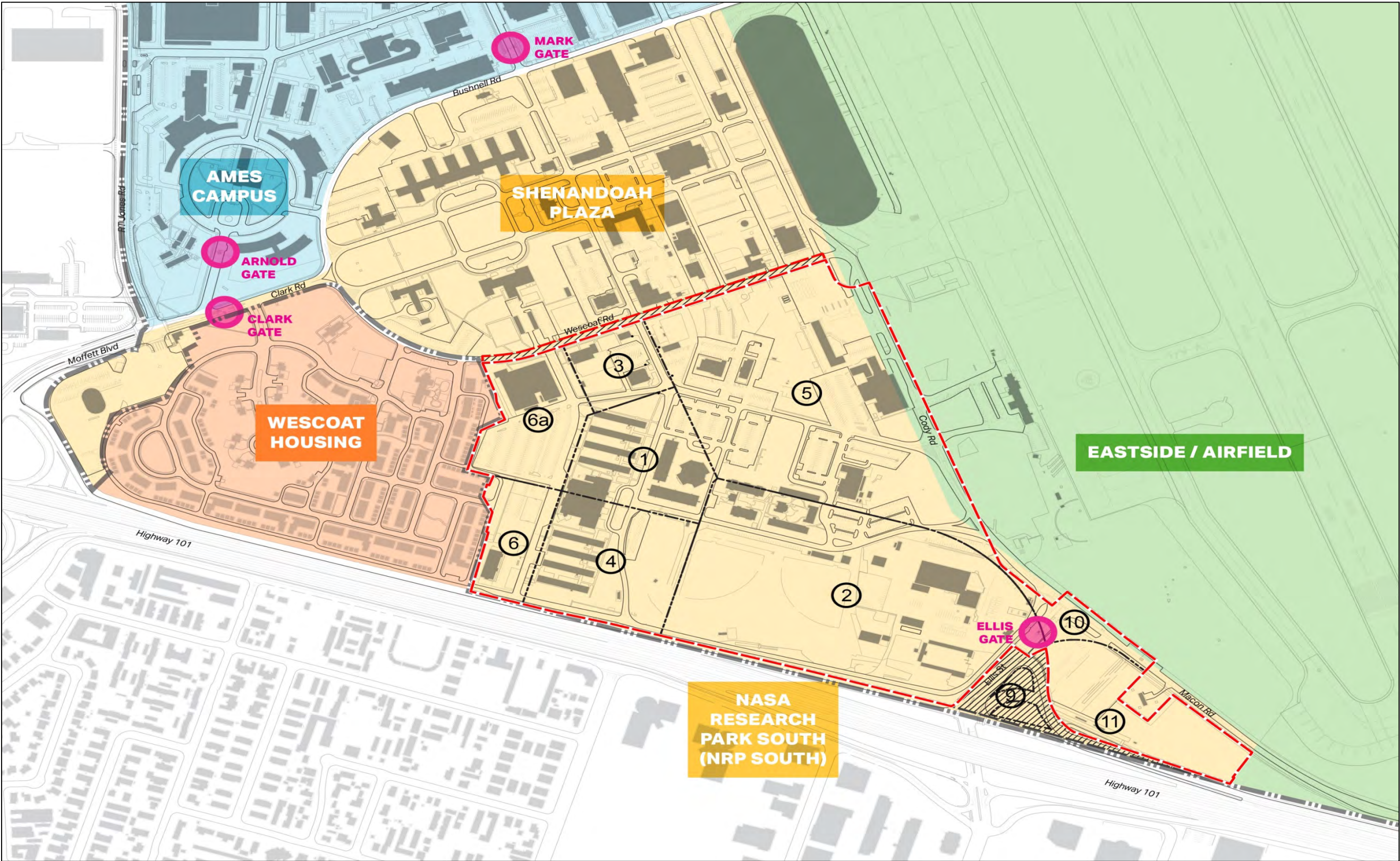


Figure 1-1 EBS Study Area and Parcels

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2. Survey Methodology

2.1 Approach and Rationale

NASA policy (NPR 8800.15C [NASA 2015]) requires that an EBS report be prepared for property that NASA plans to lease or transfer. The report must be based on existing environmental information related to storage, release, treatment, or disposal of hazardous substances or petroleum products at the subject site.

A systematic process was followed in which all available reports, records, maps, and interviews were analyzed. Reported conditions were evaluated to determine their impact on the characterization, remediation, reuse, and occupation of the Study Area. On the basis of this information, conclusions were drawn relative to the environmental conditions of the Study Area. As discussed previously, physical inspections of the Study Area and sampling to identify any new potential environmental concerns, or to verify information obtained during the records review were not conducted as part of this EBS.

2.1.1 Description of Documents Reviewed

The baseline for this EBS document primarily was the 2001 EBS documents for Parcel 5, 2–4, and 6–7, written by Harding ESE (2001a,b). Updated information was gathered from personal interviews (described in Section 2.1.2) and review of reports about monitoring that has occurred since 2001. The documents reviewed for this EBS included:

- 2001–2002 lead and asbestos reports
- 2017 Fairchild and Regional Groundwater Remediation Program Annual Report
- Earth Resources Technologies 2016–2017 sampling/pre-demolition reports
- Building-specific hazardous materials inventories
- Building-specific indoor air sampling reports
- Middlefield Road, Ellis Street, and Whisman Road (MEW Companies) Annual Reports
- 2018 Storm water Permit Report and associated documents
- NASA Ames Historic Resources Protection Plan and Memorandum of Agreement
- NASA hazardous materials information for relevant buildings
- AECOM Technical Services, Inc. 2017 Archaeological Study
- Synthetic Minor Operating Permit Evaluation Report

2.1.2 Personal Interviews

To obtain information regarding the current use of parcels/buildings and any potential hazardous substances or petroleum products in the Study Area, several NASA staff were interviewed—in person, via e-mail, or both. They included the following people (with their subject matter expertise identified in parenthesis):

- Kobin Lee (hazardous materials)
- Ray Walker (hazardous waste, PCBs)
- Arturo Gonzalez (air quality)

- Bob Long (pesticides)
- Lili Pirbazari (indoor air quality/vapor intrusion)
- Garrett Michael Turner (groundwater, storm water, waste water, drinking water)
- Dan Winninginham (air quality)
- Jaclyn Satira (hazardous materials)
- Tony Zhang (drinking water and waste water)
- John Shepardson (lead and asbestos)
- Don Chuck (hazardous substances, oil/water separators, storage tanks, medical and biohazard waste, ordnance, radioactive wastes, radon)

2.2 Property Classification Descriptions

One objective of the EBS is to classify real property within the Study Area into environmental condition of property (ECP) parcel categories. The Base Realignment and Closure (BRAC) Cleanup Guidebook (DoD 1995), as amended by Section 331 of the National Defense Authorization Act of Fiscal Year 1997, describes the seven Department of Defense (DoD) parcel categories. The following paragraphs present the criteria used to determine the parcel categories.

Category 1: Areas Where No Release or Disposal Has Occurred

Category 1 designates those areas where no release or disposal of hazardous substances or petroleum products has occurred. Category 1 property is considered to be an uncontaminated or clean property. This category also specifies that no migration of hazardous substances or petroleum products has occurred from adjacent areas. This determination requires a minimum level of information gathering and assessment that is functionally accomplished by the EBS.

Category 2: Areas Where Only Release or Disposal of Petroleum Products Has Occurred

Category 2 designates those areas where only release or disposal of petroleum products has occurred. Parcels where only the release or disposal of petroleum products has occurred and where contamination remains automatically were placed in this category, regardless of whether cleanup actions have been implemented, planned, or are not required.

Category 3: Areas Where Release of Hazardous Substances Has Occurred, but No Remedial Action Is Required

Category 3 designates those areas where release of hazardous substances has occurred, but at concentrations that do not require removal or remedial action. Such concentrations of hazardous substances can be below defensible detection limits or above detection limits but below established action levels. Below action levels means that, in the absence of installation-specific, risk-based, or regulatory standard-based criteria, the concentrations of any hazardous substance in any medium do not exceed chemical-specific applicable or relevant and appropriate requirements. This designation also means that risk estimates associated with contamination at such areas do not:

- Exceed a cancer risk of 10^{-6} for any carcinogenic contaminant in any medium, nor exceed this level for all contaminants, taken together, in any exposure pathway;
- Result in a hazard quotient above 1 for any noncarcinogenic contaminant in any medium, nor exceed this level for all contaminants, taken together, in any exposure pathway;

- Exceed a cancer risk of 10^{-4} for any carcinogenic contaminant accumulated across all pathways; and
- Result in a hazard index above 1 for all noncarcinogenic contaminants accumulated across all pathways.

A Category 3 area designation cannot be made with confidence unless a minimum level of information gathering and assessment has been completed. Thus, all Category 3 area determinations should be made on the basis of a site inspection or equivalent level of effort, including unbiased field sampling and laboratory analysis to support a conceptual understanding of the area.

Category 4: Areas Where Release of Hazardous Substances Has Occurred, and All Remedial Action Has Been Taken

Category 4 designates those areas where EBS documents confirm that hazardous substances are known to have been released or disposed on the property, but all remedial actions necessary to protect human health and the environment with respect to any hazardous substances remaining on the property already have been taken to meet the provisions in CERCLA 120(h)(3). The meaning of “all remedial action taken” is clarified in Section 120(h)(4)(B)(i) of CERCLA. Federal agencies that prepare suitability of property for transfer maps should be aware that “all remedial action taken” means that the construction and installation of an approved remedial design have been completed, and the remedy has been demonstrated to be operating properly and successfully.

Category 5: Areas Where Release of Hazardous Substances Has Occurred, and Removal or Remedial Actions Are Underway

Category 5 designates those areas where the presence of sources or releases of hazardous substances are confirmed, based on the results of sampling and analysis found in electronic databases or environmental restoration and compliance reports. This area type contains contaminant concentrations above action levels, so that the concentrations do not meet the Category 3 definition. Remedial systems for Category 5 areas are partially or entirely in place, but have not been fully demonstrated.

Category 6: Areas Where Release of a Hazardous Substance Has Occurred, but Required Response Actions Have Not Been Implemented

Category 6 designates those areas where the release of hazardous substances is confirmed, based on the results of sampling and analysis found in electronic databases or environmental restoration and compliance reports. This category contains contaminant concentrations above action levels, so that the concentrations do not meet the Category 3 definition. In addition, the required remedial systems have not been selected or implemented.

Category 7: Areas That Are Unevaluated or That Require Further Evaluation

Category 7 designates those areas where the presence of sources or releases of hazardous substances or petroleum products is suspected but not well characterized. This determination is based on the results of a properly scoped EBS. Category 7 areas do not, with certainty, fit any of the other area types because evaluation efforts have not occurred, are ongoing, or are inconclusive.

2.3 Parcel Determinations

The Study Area has been divided into multiple parcels as part of leasing activities. This EBS report focuses on Parcels 1 through 6, 6a, 10, and 11. Based on the findings in this report, the ECP category for each of these parcels is shown in **Table 2-1**. Although the parcels were not assigned to ECP categories in the 2001 Harding ESE EBS documents, an estimated category has been generated for each parcel based on the findings in those 2001 EBS documents.

Table 2-1 ECP Category by Parcel

Parcel	Environmental Condition of Property (ECP) Category	
	2001 (estimated)	2018
1	5	5
2	5	5
3	5	5
4	5	5
5	5	5
6	5	5
6a	5	5
10	5	5
11	5	5

3. Findings Consistent for All Parcels

The following sections present findings that are consistent or similar across all parcels in the Study Area. Therefore, to reduce redundancy, the topics that are discussed in this chapter generally are not repeated for each individual parcel in Chapters 4 through 12, except for some topics where general background information is provided in this section and parcel specific information is provided in Chapters 4 through 12 (e.g., PCBs, indoor air quality/vapor intrusion).

3.1 Natural Resources

No agricultural, forestry, or mineral resources (USGS 2018) are found in the Study Area or adjacent areas. Natural resources are not discussed further in this report.

3.2 Biological Resources

In 1998, NASA began conducting annual research studies on the population of western burrowing owls that inhabit the 1,750-acre Ames Research Center (ARC) property (DCE 2002) at Moffett Field. The western burrowing owl is protected under the federal Migratory Bird Treaty Act of 1918 and is considered a “Species of Special Concern” by the California Department of Fish and Wildlife (DCE 2002). In 2001, NASA commissioned preparation of a Burrowing Owl Habitat Management Plan (BOHMP; Trulio 2001), to describe how habitat would be managed and how activities on the site would be performed, as well as to mitigate impacts and sustain the population of burrowing owls. In 2002, a Programmatic Environmental Impact Statement (PEIS) and Record of Decision (ROD) were completed for National Environmental Policy Act (NEPA) compliance documentation for the NASA Ames Development Plan (NADP). The Study Area for this EBS is included in the NADP. As part of the PEIS, a Mitigation Monitoring Plan set forth mitigation measures and required actions to reduce impacts for several environmental topics, including biological resources. The purpose of the mitigation related to burrowing owls is to protect and maintain the owl population in the NADP Study Area. Per the monitoring plan, NASA contracts a qualified ecologist and biologist during breeding season (April 1 through July 31), to monitor and record population demographics, including burrowing sites, reproduction rates, and mortality rates. A 22-acre preserve has been designated adjacent to the airfield east of the Study Area and within the airfield operations area as part of the Mitigation Monitoring Plan. The preservation of the population at NASA Ames has wide implications for the species within the larger region (ERT 2015a). NASA's goal is to allow the population to flourish by protecting breeding and habitable areas from future development. Protocols are in place to ensure that mitigation measures from the 2002 PEIS are followed. Both the 2017 and 2018 monitoring survey maps showed no active nests or satellite burrows in the Study Area.

3.3 Cultural Resources

In February 2017, an Archaeological Resources Study (AECOM 2017) of the NASA Ames Research Center was conducted by AECOM Technical Services, Inc. (AECOM). The archaeological desktop study identified areas of high archaeological sensitivity related to historic-era archaeological deposits in the Study Area (northern and southwestern areas). In addition, prehistoric occupation sites were documented east and west of the Study Area. Although prehistoric sites were evaluated and determined to be ineligible for the National Register of Historic Places (NRHP) because of a lack of surficial evidence, the 2017 study points to a lack of systematic subsurface testing to rule out additional archaeological deposits related to these sites that may extend into the Study Area boundaries. According to AECOM (Meiser, pers. comm., 2018), portions of the Study Area have not been surveyed for archaeological resources, and several buildings may require evaluation or re-evaluation for eligibility for the NRHP, to determine whether they are historic properties under Section 106 of the National Historic Preservation Act. AECOM's recommendation is to survey all areas

within any future development's footprint that have not been surveyed previously (Meiser, pers. comm., 2018). All future development in the Study Area would be subject to Section 106 and the NEPA requirements, including the mitigation measures indicated in the PEIS and subsequent documents. In addition, adherence to NASA Ames' policies regarding inadvertent discoveries, as outlined in the 2014 Integrated Cultural Resources Management Plan (ICRMP), would be required (AECOM 2014). The ICRMP details standard operating procedures (SOPs), including how to address inadvertent discovery of archaeological resources (SOP No. 8), and treatment of human remains and funerary/sacred objects (SOP No. 9). In the event that archaeological deposits are inadvertently discovered through ground-disturbing activities or otherwise, work would cease in the vicinity of the finding, the Center Cultural Resources Manager would be notified, and a professional archaeologist would be consulted, in accordance with federal regulations. In the event that human remains are inadvertently discovered, work would cease in the vicinity of the remains and the site supervisor would be responsible for contacting NASA Center Protective Services and the Environmental Management Division to determine temporal components of the remains and further courses of action (AECOM 2014).

3.4 Medical/Biohazardous Wastes

No medical/biohazardous waste is known to be in the Study Area. The 2001 EBS lists one historic clinic, the Naval Regional Hospital Branch Clinic, as being west of Shenandoah Plaza. The Chief of Environmental Management has confirmed that, to his knowledge, no updates exist to the findings of the 2001 EBS regarding medical/biohazardous wastes (Chuck, pers. comm., 2018a). Medical/biohazardous wastes are not an environmental concern in the Study Area and are not discussed further in this report.

3.5 Ordnance

No evidence exists that ordnance was used or stored on the Study Area parcels (Tetra Tech 1994), and no current ordnance use occurs in the Study Area (Chuck, pers. comm., 2018a). Several high explosive magazines, an ordnance shop, and a missile magazine are on the northeastern side of Moffett Field, several thousand feet from the Study Area (Harding ESE 2001a).

3.6 Radioactive Wastes

Radioactive wastes are a byproduct from nuclear reactors, fuel processing plants, or the decommissioning and dismantling of nuclear reactors and other nuclear facilities. In 1993, a radiological survey was performed in the former Navy weapons storage and laboratory buildings that held and handled hazardous wastes associated with the weapons. The results of the investigation revealed low background levels of radioactive wastes. The survey did not find any radioactive contamination. Ultimately, the rooms sampled were released for unrestricted use (CWMI 1994). According to Bill Vermeere, PAI/ISSi Radiologist Specialist (Vermeere, pers. comm., 2000), radiological materials are used only in the Hangar 2 and 3 areas and in several NASA buildings, and not in the Study Area. The absence of radiological materials in the Study Area was confirmed to be true by NASA's Chief of Environmental Management (Chuck, pers. comm., 2018a).

3.7 Radon

Historically, the Navy was required to investigate levels of radon, to be in compliance with federal law. The EBS conducted by Harding ESE in 2001 states that several buildings within the boundaries of the NRP (and within the scope of this EBS) were tested for radon between 1988 and 1994. The investigations found radon in non-actionable levels, less than 1 pCi/L (pCi/L) (Harding ESE 2001a). The U.S. Environmental Protection Agency (USEPA) action level for radon is above 4 pCi/L. The buildings previously tested within the scope of this EBS are shown in **Table 3-1** by their updated parcel numbers. Based on the results of the radon monitoring programs conducted for

the Moffett Field buildings and the few buildings in the Study Area, and the similarities between those buildings and other Study Area buildings, it is unlikely that radon is present in buildings in the Study Area above USEPA's 4 pCi/L action level (Harding ESE 2001a; Chuck, pers. comm., 2018a).

Table 3-1 Buildings Historically Tested for Radon in the Study Area

Parcel	Buildings Tested for Radon
Parcel 2	Building 111, formerly office/maintenance (vacant), currently used for storage Building 146, formerly a California Air National Guard transportation garage, currently used for storage
Parcel 4	Building 153, formerly barracks, currently used for office space Building 154, formerly barracks, currently used for office space Building 155, formerly barracks, currently used for office space

Source: Harding ESE 2001a

3.8 Mold

No mold has been investigated or identified in the Study Area (Harding ESE 2001a), and therefore this topic is not discussed further in this report.

3.9 Pesticide

Normal use of pesticides, herbicides, and fertilizers has occurred over the years in the Study Area. However, the extent and types used are unknown. Therefore, the potential exists for residual levels of pesticides in soil and groundwater in the Study Area (Harding ESE 2001a). Currently, pesticide (primarily Round-Up Pro Concentrate Herbicide) is sprayed on landscaped and hardscaped areas. The primary areas treated with pesticide are the softball fields (in Parcel 2) and open space between buildings. Some hardscape areas and road edge areas also are sprayed with pesticides, to keep weeds under control. Landscaping equipment and vehicles are kept around Building 184 in Parcel 2; however, all mixing and storage of pesticides is kept off-site (i.e., off NASA Ames property) (Long, pers. comm., 2018).

3.10 Drinking Water

No known drinking water wells are in the Study Area (Turner, pers. comm., 2018a). Building MF 1025A in Parcel 11 is a 400,000-gallon domestic water tank (Chuck, pers. comm., 2018b; Turner, pers. comm., 2018a).

3.11 Mixed Waste

On the basis of the results of Phase 1 Environmental Site Assessments (ESAs) conducted in 1993 for NASA (CWMI 1993a,b,c,d; SEC Donahue 1993; Uribe and Associates 1993), and the multi-media audit conducted by SAIC in August 1995, no mixed-waste storage areas are in the Study Area (Harding ESE 2001a,b).

3.12 Waste Water Treatment, Collection, and Discharge

Waste water generated in the Study Area is transported via underground sewer lines to the Sunnyvale Water Pollution Control Plant. NASA does not treat any waste water on site (Chuck, pers. comm., 2018b; Turner, pers. comm., 2018a). No sewer system studies have been conducted since 1997, no

known upgrades have occurred to the sewer system, and no known contamination issues exist relative to the sewer system (Turner, pers. comm., 2018a).

3.13 Surface Water/Storm Water

Most of the Study Area is within the Western Drainage System at NASA Ames. All storm water from this drainage system is discharged to the storm water retention pond north of the Study Area, after first passing through the storm water settling basin, which is a best management practice employed by NASA for storm water management (Turner, pers. comm., 2018c). The eastern portion of Parcel 2 (from Building 992 eastward) and Parcels 10 and 11 are within the Eastern Drainage System, where storm water flows to the Northern Channel (NASA 2003).

NASA holds a general industry storm water discharge permit, which is regulated under a National Pollutant Discharge Elimination System Permit (NPDES) No. CAS000001: General Permit for Storm Water Discharges Associated with Industrial Activities, Order 2014-0057-DWQ (IGP) (Turner, pers. comm., 2018b). NASA samples effluent from the settling basin four times per year as part of the IGP Storm Water Pollution Prevention Plan (SWPPP) (Turner, pers. comm., 2018c). No storm water monitoring sampling locations are in the Study Area (Turner, pers. comm., 2018b).

No surface water bodies are in the Study Area (Turner, pers. comm., 2018b). Also, no known flooding issues exist, and no major storm water facilities are in the Study Area (Turner, pers. comm., 2018b). No studies on storm water, surface water, storm drains, or storm water infrastructure have been conducted since 2001, and no upgrades to storm water infrastructure have occurred since 2001, either (Turner, pers. comm., 2018b).

3.14 Hazardous Substances

The wide variety of historical land uses in the Study Area has resulted in hazardous materials and waste being in several buildings throughout the Study Area over time. Several Phase 1 ESAs were conducted in the early 1990s by a variety of companies for buildings at Moffett Field, including buildings in the Study Area. Information about hazardous substances for each parcel is based on these assessments and a subsequent inventory prepared by NASA and included in the Parcel 5 EBS document from 2001 (Harding ESE 2001a). Since 2001, a reduction has occurred in both the use of hazardous materials in the Study Area and the number of buildings where hazardous materials and waste are located (reduced from 12 to four buildings). No known hazardous materials have been used in the Study Area since 2001, other than those discussed in this report as currently being in buildings in Parcels 2 and 4.

Uncontrolled blasting may have occurred in aircraft support zones in the Study Area, but no documented locations are known (Harding ESE 2001a). Abrasive materials are not discussed further in this report.

3.15 CERCLA-Related and Petroleum Contamination

The MEW Superfund and Moffett Field Superfund sites are funded under CERCLA, which allows USEPA to recover natural resources damaged by the release of hazardous substances and/or volatile organic compounds (VOCs). Under CERCLA, USEPA has assigned responsibility to the MEW Companies, the Navy and NASA to conduct remedial activities, to address vapor intrusion as well as groundwater and soil contamination that resulted from previous land uses.

The Navy has identified several locations throughout the Study Area that are considered to have contaminated groundwater, soils, and air above cleanup goals prescribed by previous USEPA RODs. Parcels 2, 4, and 5 contain CERCLA sites (see **Figure 3-1**), and thus specific descriptions of the

CERCLA-related and petroleum contamination sites are presented in Chapters 6, 7 and 8. Parcels 1, 3, 6, 6a, 10, and 11 do not contain CERCLA-related sites, and therefore no discussion is included about CERCLA-related and petroleum contamination for these parcels. However, this does not indicate the absence of groundwater contamination in parcels that do not have CERCLA-related sites. Groundwater contamination in the Study Area is discussed next.

3.16 Groundwater

The Study Area and surrounding region sit on part of the northern portion of the Santa Clara Valley Subbasin. Groundwater in the sub-basin generally follows the ground surface topography, flowing northerly toward the San Francisco Bay (SCVWD 2010). The hydrostratigraphy of the subbasin has been defined and separated into water-bearing zones, summarized in **Table 3-2**.

Throughout the 1960s and 1980s, several buildings in the general area were used for industrial chemical mixing and silicon manufacturing, among other industrial uses, resulting in a plume of groundwater and soil contaminated with VOCs in the Study Area, which is referred to as the West Side Aquifers or Regional Plume (see **Figure 3-1**). The contamination originated south of Highway 101 and is called the MEW Superfund Site, which is a 0.5-square-mile area bounded by East Middlefield Road, Ellis Street, Whisman Road, and Highway 101. Because of the contamination from the MEW Superfund Site, groundwater moving northerly toward the Bay continues to contaminate groundwater under the Study Area. The Navy and NASA share responsibility with the MEW Companies for remedial efforts because of activities that contributed to groundwater contamination. In 1989, USEPA issued an ROD and two subsequent Explanation of Significant Differences (ESDs) (Geosyntec Consultants 2018), requiring remedial actions for the entire site (north and south of Highway 101).

Table 3-2 Water-Bearing Zones of the Santa Clara Valley Subbasin

Water-Bearing Zones	Approximate Range of Depth Intervals (feet below ground surface) ¹
A/A1 ² Zone	2–35 feet
B1/A2 ³ Zone	25–70 feet
B2 Zone	55–125 feet
B3 Zone	95–160 feet
C Zone	145–230 feet
Deep Zone	greater than 225 feet

Notes:

1. The depth intervals of water-bearing zones used to categorize wells are variable across the site.
2. The Navy and NASA refer to this zone as A1 north of Highway 101.
3. The Navy and NASA refer to this zone as A2 north of Highway 101.

Source: Geosyntec Consultants 2018

Groundwater throughout the NRP is recorded during monitoring (up to semi-annually) of wells, according to the MEW Regional Groundwater Remediation Program (MEW RGRP). The MEW RGRP owns and is responsible for nine source control recovery wells in the Study Area. Fairchild (a MEW group) and the Navy own additional monitoring wells, located throughout the Study Area.

Remediation activities include groundwater extraction and treatment designed to control and remove VOCs that are migrating beyond the source control recovery wells (Geosyntec Consultants 2018). Groundwater extracted from the Regional Plume in the Study Area is conveyed to the North 101 Treatment System facility, at the corner of Wescoat Road and McCord Avenue in the Public Works

Building (Building 016) in Parcel 17 (outside the Study Area) (see **Figure 3-2**). A double-contained conveyance pipeline that transports extracted groundwater to the North 101 Treatment System facility runs through portions of Parcels 1 through 6. The double containment piping provides protection from contaminated water potentially leaking into surrounding soils as it is transported to the treatment system facility. **Table 3-3** lists buildings and roads by parcel, adjacent to the North 101 Treatment System pipeline that flows northward through the Study Area to the North 101 Treatment System facility.

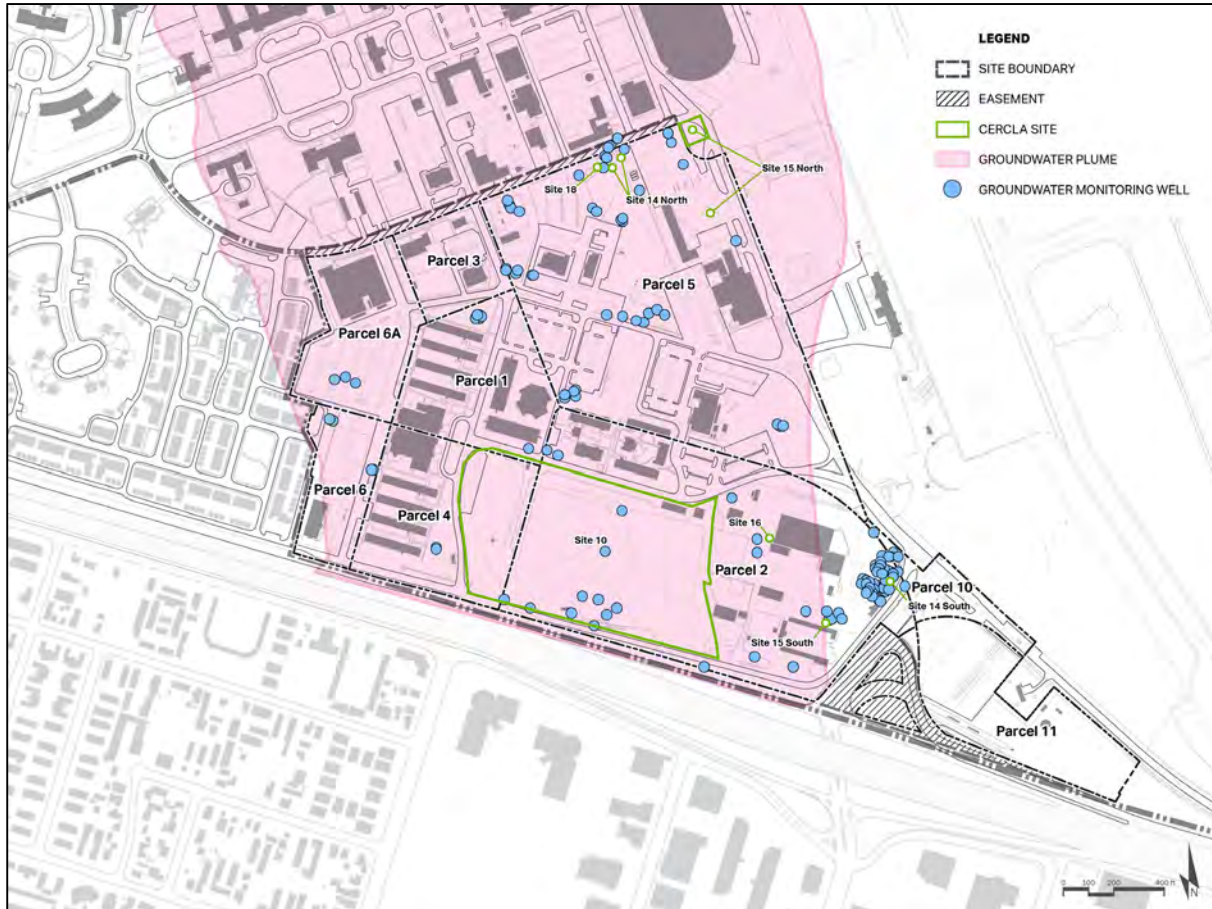
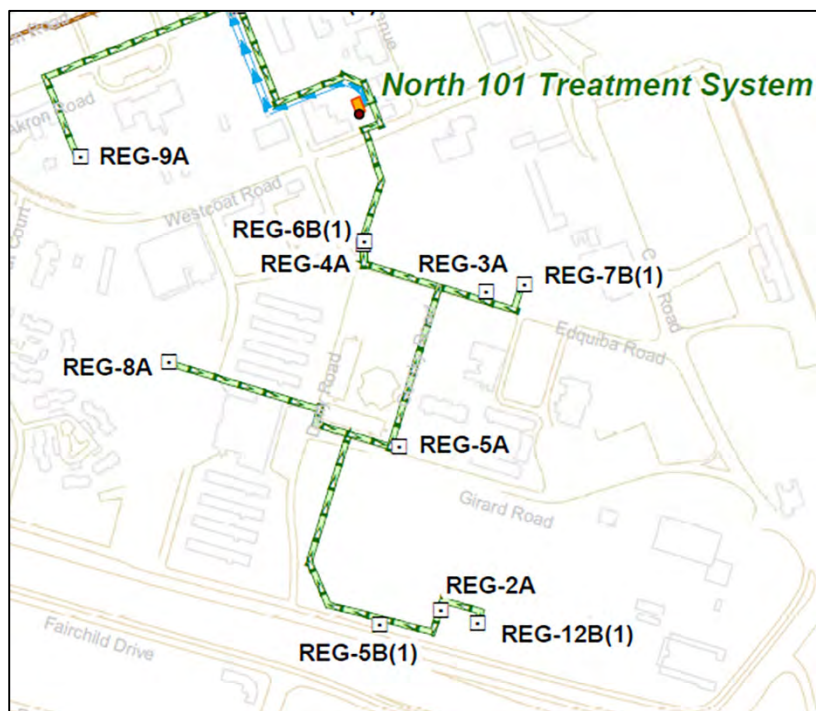


Figure 3-1 Groundwater Plume, Groundwater Wells, and CERCLA Sites

Table 3-3 Buildings and Roads Adjacent to the North 101 Treatment System Pipeline

Parcel	Building/Road	Treatment System Pipeline Alignment
1	583B, 151	Northwest to northeast between Buildings 151 and 152, continuing over Dailey Road to the south of Building 583B along Girard Road, and turning northeast on Gorsky Road
2	82	Southern: Southeast to southwest, south of the softball fields, just south of Building 082 to Parcel 4 Northern: Between Parcels 1 and 2, south to north along Gorsky Road through Parcels 1 and 5
4	152, 534, 964, 965	Southern: North to the west of Buildings 534, 964, and 965 Northern: West to east between buildings on the north side of Building 152
5	529, 556	East to west along Edquiba Road, turning north between Buildings 529 and 556 and going out to Wescoat Road
6	Bailey Road	Beginning in the parking lot and running west to east through Parcels 4 and 1

Source: Geosyntec Consultants 2018:Figure 6



Source: Geosyntec Consultants 2018

Figure 3-2 North 101 Treatment System Facility and Pipeline Locations

The primary VOC constituents of concern within the MEW groundwater plume are trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC). Tetrachloroethene (PCE) also has been detected in groundwater monitoring, and therefore is monitored as a VOC within the plume. Other VOCs within the plume that generally have been reported below actionable levels include

chloroform, methylene, chloride, 1,1-dichloroethane, 1, 2-dichloroethane, 1, 1-dichlorethene, freon, 1,4-dioxane, and 1,1,1-trichloroethane. The North 101 Treatment System extracts 126.26 gallons of water per minute on average. In 2017, the treatment system removed 385 pounds of VOCs from 58.6 million gallons of extracted groundwater. The Navy received an NPDES Permit from the RWQCB on October 20, 1998, and on August 25, 1999 for authorization to discharge treated groundwater (Harding ESE 2001a). The current VOC and Fuel General Permit (NPDES No. CAG912002)(Order No. R2-2012-0012) was adopted on February 8, 2012. The next VOC and Fuel General Permit will be submitted (Order No. R2-2017-0048) in late 2018, and is anticipated to be in effect from January 1, 2019. The treated water is monitored and sampled (to remain in compliance with the NPDES Permit), and then is discharged to Stevens Creek. In conjunction with discharging to Stevens Creek, the treatment system was constructed with a bypass valve that allows treated groundwater to be diverted for reuse by NASA.

In its annual progress report, Geosyntec Consultants (2018) stated that it expects to receive written approval from USEPA to reduce groundwater monitoring from annual to biennial, following a successful trial reduction in monitoring and sampling frequency that was completed in February 2017. As of March 2018, Geosyntec Consultants had not received written approval but had implemented the conditions set forth by USEPA to reduce sampling events. Per the 2017 annual progress report, sampling was scheduled to occur in September–October 2018 (Geosyntec Consultants 2018), and is to continue every 2 years thereafter.

The federal and State maximum concentration level for TCE is 5 micrograms per liter ($\mu\text{g/L}$) (SWRCB 2017). USEPA's ROD prescribes groundwater cleanup goals of TCE for the Study Area to be below 5 $\mu\text{g/L}$ in waterbearing zones A and B, and below 0.8 $\mu\text{g/L}$ for waterbearing zones C and D. Per the ROD and subsequent ESDs, levels of TCE have been chosen to gauge remediation success, with the expectation that achieved cleanup levels for TCE will result in decreased levels of other VOCs (USEPA 1989). **Table 3-4** lists VOC concentration levels from the 2017 annual progress report, by parcel. For the parcels listed in **Table 3-4**, which contain wells that were monitored for groundwater VOCs in 2016, a summary of the test results listed in the table are provided in subsequent chapters. The parcels not listed in **Table 3-4** also have groundwater contamination, but they do not include wells that were tested in 2016.

3.17 Storage Tanks and Oil Water Separators

Some aboveground and belowground storage tanks are found throughout the Study Area, and a few remnant oil water separators. These facilities are shown in **Figure 3-3** and are discussed in subsequent chapters only for the parcels that have such items.

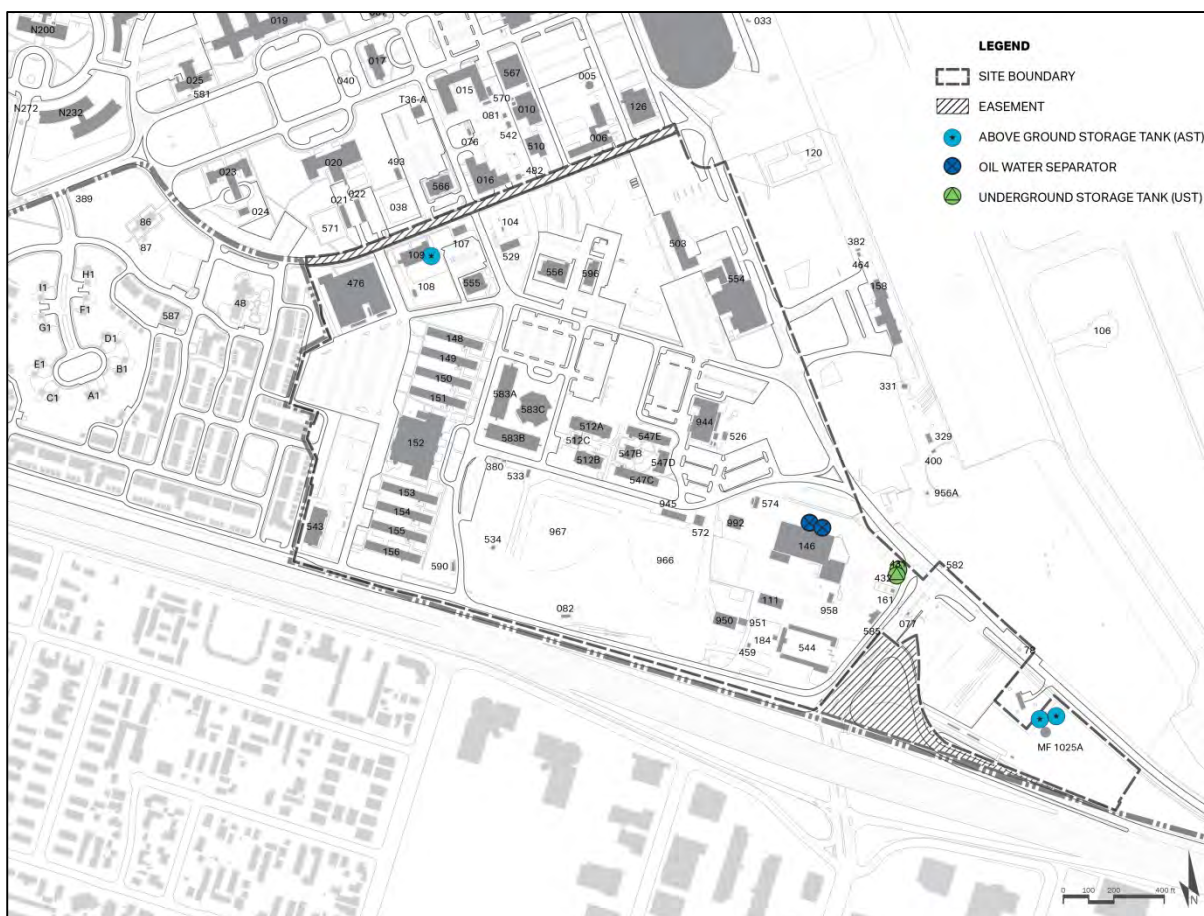


Figure 3-3 Storage Tanks and Oil Water Separators in the Study Area

3.18 Asbestos

Although asbestos is prevalent throughout the buildings in the Study Area, test data exists for individual buildings, and therefore asbestos is discussed in subsequent chapters by parcel. Updated asbestos surveys and sampling would be necessary before demolition, rehabilitation, or occupancy of any buildings in the Study Area.

3.19 Polychlorinated Biphenyls

The NASA Environmental Management Division performs quarterly inspections, completes PCB annual document logs, and submits transformer registration of equipment with concentrations of PCBs at greater than or equal to 50 parts per million (ppm), in compliance with Title 40, Section 761 of the Code of Federal Regulations, to USEPA (Harding ESE 2001a). In addition, the NASA Facilities Maintenance group completes additional inventories, inspections, and testing of the equipment. Historical documentation includes a PCB inventory of the former Naval Air Station at Moffett Field, conducted by the Navy in 1993 (NAS Moffett Field 1993). In the aforementioned document, 252 items were identified and sampled, including capacitors, regulators, oil fuse cutouts, oil circuit breakers, oil switches, and transformers (Harding ESE 2001a). PCB concentrations ranged from non-detect to 542,000 ppm (Harding ESE 2001a). Since completion of this 1993 report, many pieces of equipment have been removed and disposed, as indicated in the PCB annual document logs (Harding ESE 2001a).

Four transformers or capacitors with PCB concentrations above the California DHS-regulated concentration (5 ppm) for hazardous waste are present in the Study Area (NASA 2018d:Figure 3). However, because these items are inspected regularly and PCB releases have not been observed, these items are not considered to be an environmental concern (Harding ESE 2001a). Facilities with PCB concentrations of 5 ppm (DHS-regulated concentration) or greater are discussed in subsequent chapters for the parcels in which such facilities are located. Because no leaks have been observed during inspections, they are unlikely to have affected the environment (Harding ESE 2001a). Quarterly inspections are recorded on field sheets that are kept electronically on a database and reported annually in the PCB annual document log (Harding ESE 2001a). A visual survey was not conducted as part of this EBS.

Table 3-4 Primary VOC Concentrations by Parcel (September–October 2016)

Parcel	Well Name	Owner	Zone	Concentration (µg/L)			
				TCE	cis-1,2,-DCE	VC	PCE
1	82A	Fairchild	A/A1	280	400	0.95	1.2
	50B1	Fairchild	B1/A2	<0.50	<0.50	<0.50	<0.50
	45B2	Fairchild	B2	<1 U	<1 U	<1 U	<1 U
2	REG-5A	MEW RGRP	A/A1	410	310	<2.5	3.8
	REG-2A	MEW RGRP	A/A1	260	74	<2.0	<2.0
	72A	Fairchild	A/A1	9.7	2.7	<0.50	4.3
	W14-3	Navy	A/A1	<0.50	3.2	<0.50	<0.50
	W60-2	Navy	A/A1	73	8.9	<0.50	<0.50
	WU4-1	Navy	A/A1	640	1,100	3.3	0.76
	REG-5B(1)	MEW RGRP	B1/A2	880	230	<5.0	<5.0
	REG-12B(1)	MEW RGRP	B1/A2	2,100	260	<25	<25
	WU4-2	Navy	B1/A2	2,200	660	54	<20
4	W89-1	Navy	A/A1	150	41	<0.50	<0.50
	W89-2	Navy	A/A1	<0.50	40	31	<0.50
	W89-11	Navy	B1/A2	0.54	1.1	0.74	<0.50
	W89-12	Navy	B1/A2	830	210	8.4	<5.0
5	REG-3A	MEW RGRP	A/A1	320	190	<2.5	<2.5
	W9-38	Navy	A/A1	710	44	<2.5	<2.5
	81A	Fairchild	A/A1	14	1,500	3.4	<0.50
	WNX-1	Navy	A/A1	12	20	<1 U	<1 U
	W9-37	Navy	A/A1	<10 U	150	490	<10 U
	28SI-01	Navy	A/A1	280	440	5.2 J	11 J
	28SI-02	Navy	A/A1	<200 U	4,600	<200 U	<200 U
	28SI-05	Navy	A/A1	<100 U	3,100	34 J	<100 U
	28OW-09	Navy	A/A1	5.3	1,100	71	0.71 J
	WU4-3	Navy	A/A1	960	950	<20 U	<20 U

Table 3-4 Primary VOC Concentrations by Parcel (September–October 2016)

Parcel	Well Name	Owner	Zone	Concentration (µg/L)			
				TCE	cis-1,2,-DCE	VC	PCE
	46B1	Fairchild	B1/A2	750	160	1.2	<0.50
	REG-7B(1)	MEW RGRP	B1/A2	770	160	<5.0	<5.0
	REG-6B(1)	MEW RGRP	B1/A2	3,100	520	<25	<25
	W9-41	Navy	B1/A2	800	410	<5.0	<5.0
	W14-5	Navy	B1/A2	<0.50	<0.50	<0.50	<0.50
	WU4-4	Navy	B1/A2	5,600	230	<200 U	<200 U
	WU4-5	Navy	B1/A2	1,300	51	<0.50	3.7
	W9SC-20	Navy	B1/A2	1,800	990	0.92	<0.50
	28OW-11	Navy	B1/A2	140	300	30	2.2 J
	28OW-19	Navy	B1/A2	230	210	96	2.8 J
	28OW-20	Navy	B1/A2	2,700	330	30 J	16 J
	28OW-23	Navy	B1/A2	<200 U	6, 100	180 J	<200 U
	28OW-24	Navy	B1/A2	3,500	230	<100 U	<100 U
	51B2	Fairchild	B2	37	0.67	<0.50	<0.50
	74A	Fairchild	A/A1	33	4.4	<0.50	<0.50
	65A	Fairchild	A/A1	400	110	<0.50	0.55
	WU4-6	Navy	B1/A2	3,900	220	1.7	0.98
	48B1	Fairchild	B1/A2	<0.50	<0.50	<0.50	<0.50
	17B2	Fairchild	B2	5.0	<0.50	<0.50	<0.50
6	REG-8A	MEW RGRP	A/A1	110	250	2.1	<0.50
	75A	Fairchild	A/A1	5.1	270	9.7	<1.3
	PR-1-A	MEW RGRP	A/A1	<0.50	<0.50	<0.50	<0.50
	68B1	Fairchild	B1/A2	47	7.8	5.0	<0.50
	54B2	Fairchild	B2	<0.50	<0.50	<0.50	<0.50

Table 3-4 Primary VOC Concentrations by Parcel (September–October 2016)

Notes:

< indicates analyte not detected above the reported detection limit

bold indicates analyte above the reported detection limit

TCE = trichloroethene

DCE = cis-1,2,-dichloroethene

VC = vinyl chloride

PCE = tetrachloroethene

µg/L = micrograms per Liter

Qualifiers Indicate:

J – Result is less than the reporting limit but greater than or equal to the method detection limit

U – Qualified as not detected at the reporting limit

Source: Geosyntec Consultants 2018

Any buildings with fluorescent lighting may contain PCB light ballasts that must be removed and disposed properly before demolition. Because of the widespread nature of PCB-containing ballasts, they are not discussed by parcel and are assumed to be in most buildings in the Study Area.

3.20 Lead

LBP is common in the Study Area, and testing has been completed at many buildings throughout the area. Thus, lead (in paint and soils) is discussed in subsequent chapters by parcel. Updated lead surveys and sampling would be necessary before demolition, rehabilitation, or occupancy of any buildings in the Study Area.

3.21 Indoor Air Quality/Vapor Intrusion

The 1989 ROD for the MEW Superfund Site presented soil and groundwater remedial actions for the Site; however, no remedial actions related to vapor intrusion occurred because the vapor intrusion pathway at that time was not well understood, nor was the migration of VOCs from the subsurface into overlying buildings (USEPA 2010).

Subsequent to the 1989 ROD, USEPA “determined that there are potential health risks associated with long-term exposure to TCE and other MEW Superfund Site chemicals of concern through the vapor intrusion pathway in existing and future buildings overlying the shallow groundwater contamination at the MEW Site” (USEPA 2010). Therefore, USEPA completed the 2010 Vapor Intrusion ROD Amendment for the MEW Superfund Site, presenting response actions to address the potential long-term exposure risks from TCE and other chemicals through the vapor intrusion pathway. “EPA’s objective for the vapor intrusion remedy is to protect the health of current and future occupants, including workers and residents, of buildings overlying the Site’s shallow subsurface TCE contamination” (USEPA 2010).

As stated in the 2010 Vapor Intrusion ROD Amendment, response actions include:

- **For Existing Buildings:** The appropriate response action is determined by indoor air sampling and other lines of evidence for each building. If necessary, installation, operation, maintenance, and monitoring of an appropriate sub-slab/sub-membrane ventilation system.
- **Alternative for Existing Commercial Buildings:** This includes use of building’s indoor air mechanical ventilation system if the property/building owner agrees to use, operate, and monitor the system to meet remedy performance criteria and the remedial action objectives.
- **For Future (New Construction) Buildings:** This would involve installation of a vapor barrier and passive sub-slab ventilation system (with the ability to be made active).
- **Implementation of Institutional Controls (ICs) and Monitoring to Ensure the Long-term Effectiveness of the Remedy** (USEPA 2010): For the Study Area, NASA is required to comply with the Environmental Issues Management Plan and incorporate remedy requirements into the NASA Land Use Master Plan, permitting, and other appropriate documents (e.g., leases).

These response actions are designed to prevent exposure to contaminants rather than reduce the presence of the contaminants; treatment of the contaminants themselves will continue through remediation of soil and groundwater, as identified in the 1989 ROD (USEPA 2010).

As part of the Vapor Intrusion ROD Amendment, buildings are tested for indoor air quality levels of seven VOCs relative to the cleanup levels that are defined in the ROD (see **Table 3-5**).

Table 3-5 Indoor Air Cleanup Levels for Long-term Exposure for the MEW Superfund Site from the 2010 Vapor Intrusion ROD Amendment

MEW Superfund Site Chemical of Potential Concern	Indoor Air Cleanup Level ($\mu\text{g}/\text{m}^3$)		Comments
	Residential	Commercial	
Trichloroethene (TCE)	1	5	Representing 1×10^{-6} lifetime target cancer risk through application of the Cal/USEPA toxicity factor and a 1×10^{-4} lifetime target cancer risk through application of draft 2001 USEPA toxicity factor.
Tetrachloroethene (PCE)	0.4	2	Representing 1×10^{-6} lifetime target cancer risk.
Cis-1,2-Dichloroethene (cis-1,2-DCE)	60	210	Not available. Based on trans-1,2-DCE Non-cancer Hazard Index of 1.
Trans-1,2-Dichloroethene (trans-1,2-DCE)	60	210	Representing Non-cancer Hazard Index of 1.
Vinyl Chloride	0.2	2	Representing 1×10^{-6} lifetime target cancer risk. USEPA uses a larger conversion factor from residential to commercial for vinyl chloride because the residential value takes into account child exposure and higher sensitivity earlier in life.
1,1-Dichloroethane (1,1-DCA)	2	6	Representing 1×10^{-6} lifetime target cancer risk.
1,1-Dichloroethene (1,1-DCE)	210	700	Representing Non-cancer Hazard Index of 1.

Source: USEPA 2010

The results of air quality testing since 2011 are summarized in **Table 3-6**. Although a few buildings were tested prior to 2010, these results were not included because of potential methodology differences with the ROD requirements. For the parcels listed in **Table 3-6**, which contain buildings that have been sampled for indoor air quality, a summary of the test results listed in the table are provided in subsequent chapters. The parcels and/or buildings not listed in **Table 3-6** may be subject to future testing, relative to USEPA's 2010 Vapor Intrusion ROD Amendment.

Table 3-6 Summary of Indoor Air Quality Testing Results by Parcel

Parcel	Building Number	Year Sampled	Concentrations Found to be Below Commercial Indoor Air Cleanup Levels from 2010 Vapor Intrusion ROD Amendment
1	583A	2011	Yes
	583B	2011	Yes
	583C	2011	Yes
2	146	2011	Yes
	547B	2015	Yes
	547D	2015	Yes
	572	2015	Yes
	945	2015	Yes

Table 3-6 Summary of Indoor Air Quality Testing Results by Parcel

Parcel	Building Number	Year Sampled	Concentrations Found to be Below Commercial Indoor Air Cleanup Levels from 2010 Vapor Intrusion ROD Amendment
3	109	2015	Yes
4	152	2016	Yes
	153	2015	Yes
	154	2012	Ambient TCE was above the long-term cleanup level
	156	2015	Yes
5	503	2011	Yes
	554	2011	Yes
	556	2016	Yes
	596	2011	Yes
	944	2011	Yes
6	543	2011	Yes

Sources: Haley & Aldrich 2011, 2012, 2016a,b

3.22 Air Quality

NASA applied to the Bay Area Air Quality Management District (BAAQMD) for a Synthetic Minor Operating Permit in 2011 (permit issued in 2012), which establishes federally enforceable permit conditions to achieve a maximum of 90,000 tons/year of greenhouse gases (GHGs) and 95 tons/year of regulated air pollutants (BAAQMD Undated). As part of the application process, an air emissions inventory of all sources of air pollutants throughout the ARC property was conducted in 2011. The inventory was split into three sources of air pollutants: combustion sources, evaporative loss sources, and miscellaneous sources (BAAQMD Undated). In the inventory, 279 air emissions sources throughout the ARC were identified (BAAQMD Undated). Of these sources, facilities in eight buildings in the Study Area were identified as external combustion sources; no internal combustion sources or miscellaneous sources were identified in the Study Area (BAAQMD Undated). Three evaporative loss sources are facility-wide: solvent wipe cleaning, coating operations, and laser seeding. One Synthetic Minor Operating Permit condition (#8790) is related to facility-wide laser seeding: it sets a limit of 200 gallons during any consecutive 12-month period or 4 gallons during any one day. The air emissions sources identified in the Study Area from the 2011 inventory are described in subsequent chapters for the relevant parcels (Parcels 1–5). Air quality is not discussed for the other parcels (Parcels 6, 6a, 10, and 11) because no air emissions sources were identified in these parcels.

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4. Findings for Parcel 1

4.1 History and Current Use

The majority of the buildings in Parcel 1 were constructed in the 1950s and 1980s. None of the buildings in Parcel 1 are listed in the NRHP. Historic uses of the buildings in Parcel 1 were varied and included barracks, administration, and a bus shelter. Current uses of the buildings in Parcel 1 include offices and housing. **Table 4-1** summarizes key information for the buildings in Parcel 1, including historic use, size of the building, year constructed, and current use. **Figure 4-1** shows Parcel 1 and the buildings within it. **Appendix A** includes a photo of each of the buildings in Parcel 1.

Table 4-1 Summary of Historic and Current Use of Buildings in Parcel 1

Building	Historic Use	Area (gross square feet)	Year Constructed	National Register of Historic Places Eligibility Status	Current Use
148	Enlisted Men's Barracks	15,785	1953	No	Mothballed ¹
149	Enlisted Men's Barracks	16,013	1953	No	Mothballed
150	Enlisted Men's Barracks	15,550	1953	No	Mothballed
151	Enlisted Men's Barracks	15,546	1953	No	Mothballed
380	Bus/Personnel Shelter	-	1957	No	Bus/Personnel Shelter
583A	NASA Exchange Lodge	30,900	1985	No	Housing—Dorm
583B	NASA Exchange Lodge	30,900	1985	No	Housing—Dorm
583C	Administration Building	13,140	1985	No	Housing—Dorm (Singularity University)

Notes:

1. Mothballed means use of the building has ceased, but this does not preclude future use of the building.

Sources: GIS data and Harding ESE 2001a

4.2 Environmental Setting

The following sections describe the identified environmental conditions for Parcel 1. These conditions are shown in **Figure 4-2**.

4.2.1 Hazardous Substances

Prior to 1994, hazardous materials (cleaning supplies) were kept in Building 583C (Harding ESE 2001a). From 1994–2000, hazardous waste consisting of solids contaminated with absorbent oil were kept in Buildings 583A, B, and C (Harding ESE 2001a). Currently, no hazardous materials or waste are in any of the buildings in Parcel 1 (Chuck, pers. comm., 2018b). However, oil-filled transformers are in Buildings 149 and 583C (NASA 2018d).

4.2.2 Groundwater

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs, which are recorded during monitoring (up to semi-annually) of wells throughout the Study Area. **Table 3-4** lists VOC concentration levels from the 2017 Annual Progress Report. In Parcel 1, only one of the three wells (82A) showed analytes above the reported detection limits.

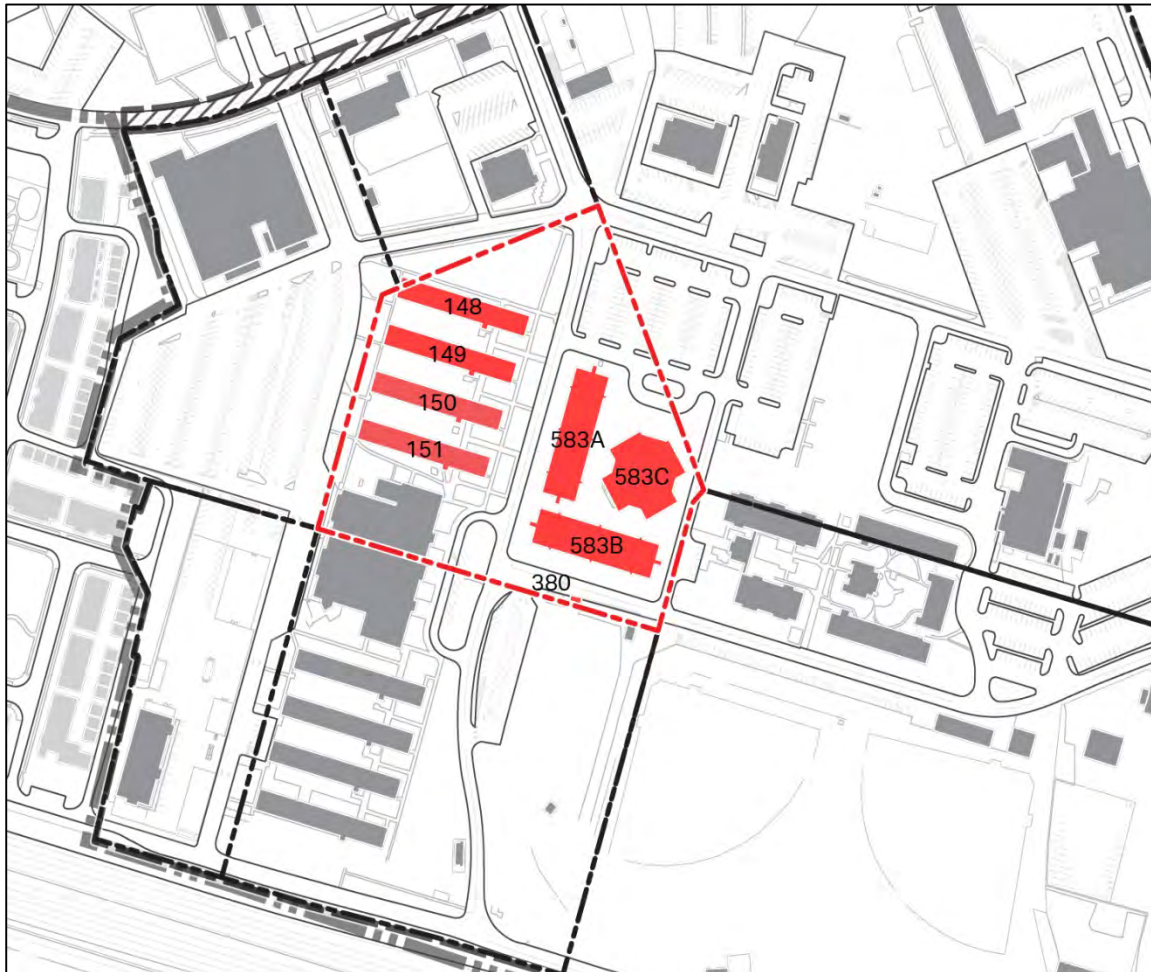


Figure 4-1 Map of Parcel 1

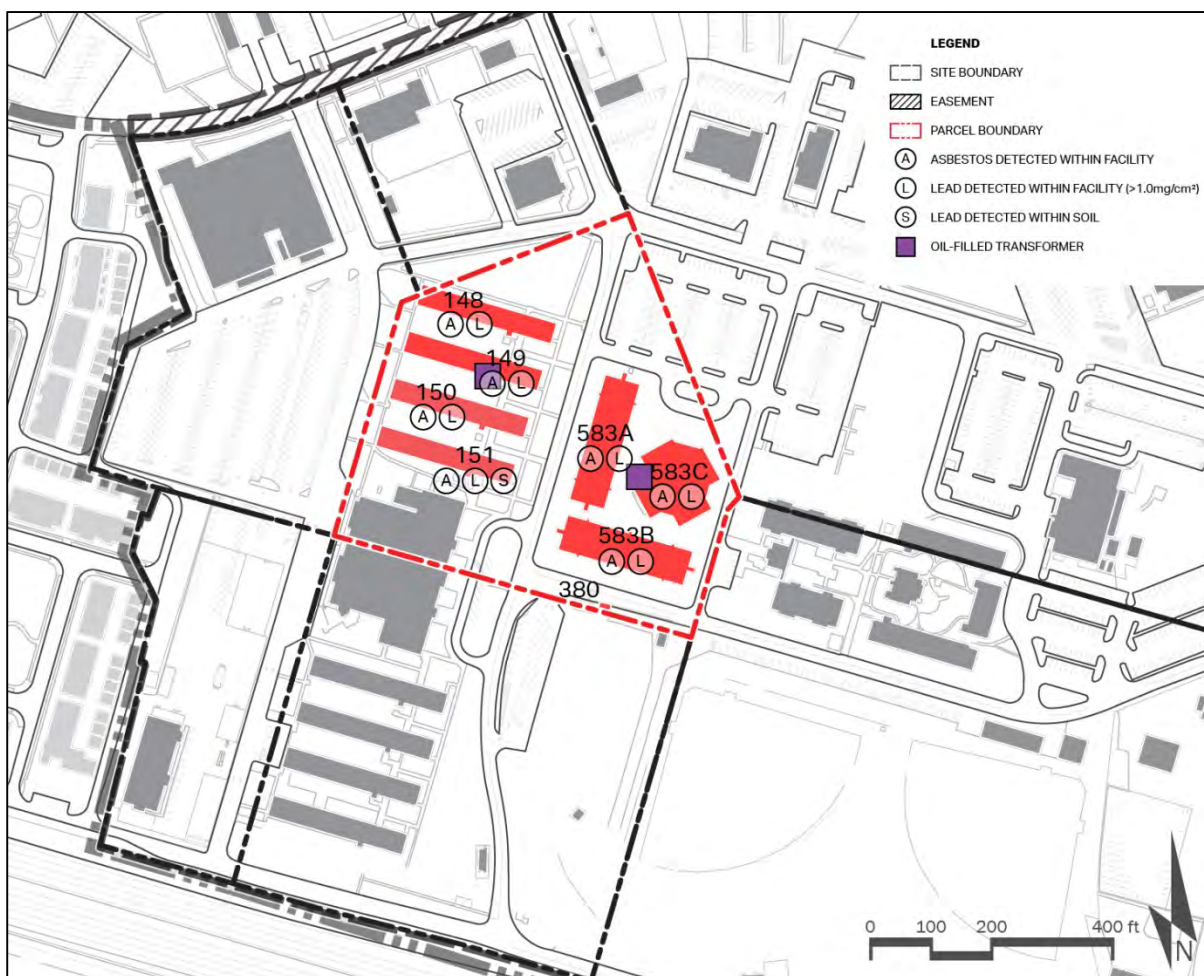


Figure 4-2 Parcel 1 Environmental Conditions

4.2.3 Storage Tanks

According to NASA staff, a UST was near the southwestern corner of Building 583C, but it has been removed and was not known to contain fuel. Exactly where or when this tank was removed is unknown.

4.2.4 Asbestos

Asbestos is categorized in one of two ways: friable or non-friable material. Friable asbestos-containing materials (ACM) can be pulverized by hand. Non-friable ACM must undergo destructive forces before fiber release can occur. For most of the buildings in Parcel 1, an Asbestos Hazard Emergency Response Act (AHERA) style asbestos survey was conducted in 2001 by Benchmark Engineering, to determine the locations of accessible and, to the extent feasible, inaccessible friable and non-friable ACM. The inspections varied by building as to whether interior and/or exterior materials were reviewed. **Table 4-2** summarizes when the buildings in Parcel 1 were sampled for asbestos, what materials were found to contain friable or non-friable asbestos, and what materials were assumed to contain asbestos.

Table 4-2 Asbestos Survey Results for Buildings in Parcel 1

Building Number	Building Name	Year Surveyed	Asbestos Detected in These Friable (or Jacketed Friable) Materials	Asbestos Detected in These Non-Friable Materials	Materials Assumed to Contain Asbestos
148	Enlisted Men's Barracks	2001	Pipe elbows, pipe insulation	Floor-mastic, floor tile, roofing material, sink undercoating, wall board	Fire door
149	Enlisted Men's Barracks	2001	Pipe elbows, pipe insulation	Floor-mastic, floor tile, roofing material, sink undercoating, wall board	Fire door"
150	Enlisted Men's Barracks	2001	Pipe elbows, pipe insulation	Floor tile, roofing material, sink undercoating	Fire door
151	Enlisted Men's Barracks	2001	Pipe elbows, pipe insulation	Adhesive, floor tile	Fire door
583A	Nasa Exchange Lodge	2001	None	Roofing tar	Not Applicable
583B	Nasa Exchange Lodge	2001	None	Roofing tar	Not Applicable
583C	Administration Building	2001	Pipe insulation	Mastic, roof-shingled	Not Applicable

Notes:

Building 380 was not sampled for asbestos, and therefore is not listed in the table

Not Applicable – no mention of these materials was contained in the survey report.

Sources: Benchmark 2001 (asbestos reports)

Asbestos abatement was conducted in 2004, during removal of loose asbestos-containing roofing mastics on vent pipes at Building 583C (PAI 2003). In 2017, asbestos abatement in acoustical ceiling tiles was conducted in Building 583B, in Rooms 317, 319, 322, and 324. Visual inspections and air sampling results indicated that acceptable asbestos exposure conditions existed following the abatement activities (ERT 2017a).

4.2.5 Polychlorinated Biphenyls

Several facilities above the DHS-regulated concentration of 5 ppm PCBs are in Parcel 1. Three transformers at Building 149 were tested in 1993, and were found to contain 505,000 to 542,000 ppm PCBs (Harding ESE 2001a); however, these three transformers have been replaced with one non-PCB containing transformer (i.e., an oil-filled transformer). Three different oil fuse capacitors also were tested in 1993, and were found to contain 14 to 17 ppm PCBs (Harding ESE 2001a).

4.2.6 Lead-based Paints and Lead in Soils

Surveys were conducted in 2001, to determine the presence of LBP at most of the buildings in Parcel 1. Visual inspections, sampling, and analysis were conducted on the inside and outside components of buildings throughout the parcel, with the exception of Building 380, a former bus stop. Paint chip samples and assays were taken using an X-ray fluorescence measurement instrument.

Levels of lead above 1.0 milligram per square centimeter (mg/cm²) in residual LBP are considered to be above USEPA actionable levels and would require regulatory compliance with California Occupational Health and Safety (CAL OSHA) and California Department of Public Health (CDPH) standards before renovation or demolition (USEPA 2018; CDPH 2014). **Table 4-3** summarizes where lead was detected above USEPA levels, on or within buildings in Parcel 1.

Surface soil samples were collected from the perimeter of several buildings in the Study Area in 1993. **Table 4-3** shows the results of any sampling done around buildings in Parcel 1 and notes whether any samples were found to have lead detected above USEPA Region 9 residential PRGs or industrial PRGs. Of the buildings surveyed in Parcel 1, one building was found to exceed USEPA PRGs—Building 151, for both residential and industrial PRGs.

Table 4-3 Lead-based Paint and Lead in Soil Survey Results for Buildings in Parcel 1

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm ²)	Lead Detected Exteriorly (>1.0mg/cm ²)	Lead in Soil Above Residential/ Industrial PRG
148	Enlisted Men's Barracks	2001	Laundry Room Walls, Door Trim, Hallway Bathroom Tile Wall, Stairway Handrail, Hallway Door Trim, Recreation Room Chair Rail, TV Room Kick Panel	Windows, Window Sills, Stair Handrails, Door Casings, Door Frame	No/No
149	Enlisted Men's Barracks	2001	Recreation Room Window, Storage Room Walls, Hallway Bathroom Walls, Hallway Windows, Window Jambs, Fire Exit, Door Casing Stair Handrail Common Area Wall, Steel Post, Common Wall, Transformer Room Door	Windows, Jambs, Sills, Casings, Door Casings, Stair Handrails, Fire Exit, Overhang, Concrete Cap	No/No
150	Enlisted Men's Barracks	2001	Recreation Room: Window Frames Kitchen: Window Frames Storage Room: Common Wall, Drain Pipe Laundry Room: Wall Cabinets/Sinks Hallway Bathroom: Tile Wall Common Area: Window Frames, Hallway: Window Frames Stairway: Handrail	Stair Handrail, Doors, Door Casings, Window Frames, Window Sill, Flashing	No/No

Table 4-3 Lead-based Paint and Lead in Soil Survey Results for Buildings in Parcel 1

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm ²)	Lead Detected Exteriorly (>1.0mg/cm ²)	Lead in Soil Above Residential/ Industrial PRG
151	Enlisted Men's Barracks	2001	TV Room: Windows, Baseboard, Porch Ceiling, Closet Supports Recreation Room: Window Storeroom: Closet Supports Hallway Bathroom: Tile Wall, Overhang Hallway: Window Room 201: Window Frame Laundry Room 6: Drain, Cabinet Sink	Windows, Window Sills, Door, Door Casings, Hand Rails, Electrical Boxes, 6-inch Drain	Yes/Yes
583A	NASA Exchange Lodge	2001	Bathroom Tile Walls	Lead-based paint was not identified on any exterior building components.	Not Sampled/Not Sampled
583B	NASA Exchange Lodge	2001	Bathroom Tile Walls	Railing	Not Sampled/Not Sampled
583C	Administration Building	2001	Entry Way Floor, Men's Bathroom Tile Wall, Women's Bathroom Tile Wall	Exterior Door to Laundry Room	No/No

Note:

Building 380 was not sampled for lead.

Sources: Benchmark 2001 (lead reports); Harding ESE 2001a:Table 5

4.2.7 Indoor Air Quality/Vapor Intrusion

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs beneath the Study Area. These VOCs can move from the ground to indoor and ambient air via the vapor intrusion pathway and can result in long-term human health effects. **Table 3-6** lists the buildings that have been sampled as part of the MEW Superfund Site cleanup activities, following USEPA's 2010 Vapor Intrusion ROD Amendment. The three buildings that have been sampled for indoor air quality in Parcel 1 show concentrations of the seven chemicals of concern to be below USEPA's commercial indoor air cleanup levels from the 2010 Vapor Intrusion ROD Amendment.

4.2.8 Air Quality

An air emissions inventory of all sources of air pollutants throughout the ARC property was conducted in 2011. The inventory was split into three sources of air pollutants: combustion sources, evaporative loss sources, and miscellaneous sources (BAAQMD Undated). In the inventory, 279 air emissions sources throughout the ARC were identified (BAAQMD Undated). These sources included an external combustion source at Building 583—a hot water boiler (BAAQMD Undated). The inventory was not specific as to which 583 building contained this boiler (i.e., Building 583A, B, or C) (BAAQMD Undated). No internal combustion sources or miscellaneous sources were identified in the Study Area

(BAAQMD Undated). Three evaporative loss sources are facility-wide: solvent wipe cleaning, coating operations, and laser seeding. One Synthetic Minor Operating Permit condition (#8790) is related to facility-wide laser seeding, requiring a limit of 200 gallons during any consecutive 12-month period or 4 gallons during any one day.

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5. Findings for Parcel 2

5.1 History and Current Use

The buildings in Parcel 2 were constructed between 1941 and 1989. None of the buildings in Parcel 2 are listed in the NRHP. Historic uses of the buildings in Parcel 2 included recreation, barracks, administration, retail, storage, and automotive-related facilities. Current uses of buildings in Parcel 2 are varied and include storage and maintenance, while some buildings have been abandoned.

Table 5-1 summarizes key information for the buildings in Parcel 2, including historic use, size of the building, year constructed, and current use. **Figure 5-1** shows Parcel 2 and the buildings in it.

Appendix A includes a photo of each of the buildings in Parcel 2. One building in Parcel 2 (Building 343) was demolished in 2017.

Table 5-1 Summary of Historic and Current Use of Buildings in Parcel 2

Building	Historic Use	Area (gross square feet)	Year Built	NRHP Eligibility Status	Current Use
82	Athletic Storage	324	1944	No	Storage
111	Transportation Storage	4,650	1944	No	Storage
146	Transportation Garage (CANG)	18,731	1952	No	Vehicle Maintenance/ Refueler Bay
161	Gas Station	-	1952	No	Maintenance
184	NASA Environmental Storage	441	1955	No	Maintenance
343	Public Works Riggers Shop	1,773	1942	No	Demolished
432	Bulk Loading/Unloading Unleaded Storage Tank	-	1953	No	Underground Storage Tanks
459	Recreation Storage	280	1950	No	Storage
512A	Enlisted Barracks	25,408	1970	No	Abandoned
512B	Enlisted Barracks	17,230	1970	No	Abandoned
512C	Enlisted Barracks	1,148	1970	No	Abandoned
544	Auto Hobby Shop	11,180	1974	No	Mothballed
547B	NASA Exchange Service Building	2,321	1974	No	Mothballed ¹
547C	BEQ (NAR)	20,285	1974	No	Mothballed
547D	NASA Exchange Lodge	10,448	1974	No	Mothballed
572	Racquetball Courts	64	1963	No	Exchange
574	Storage Warehouse B	1,722	1982	No	Storage
585	Vehicle Wash Platform/Facility	15,840	1983	No	Mothballed
945	Athletic Field Dressing Rooms	2,676	1941	No	Storage
950	Hazardous Materials Storage	4,700	1989	No	Hazardous Waste and Transformer Storage

Table 5-1 Summary of Historic and Current Use of Buildings in Parcel 2

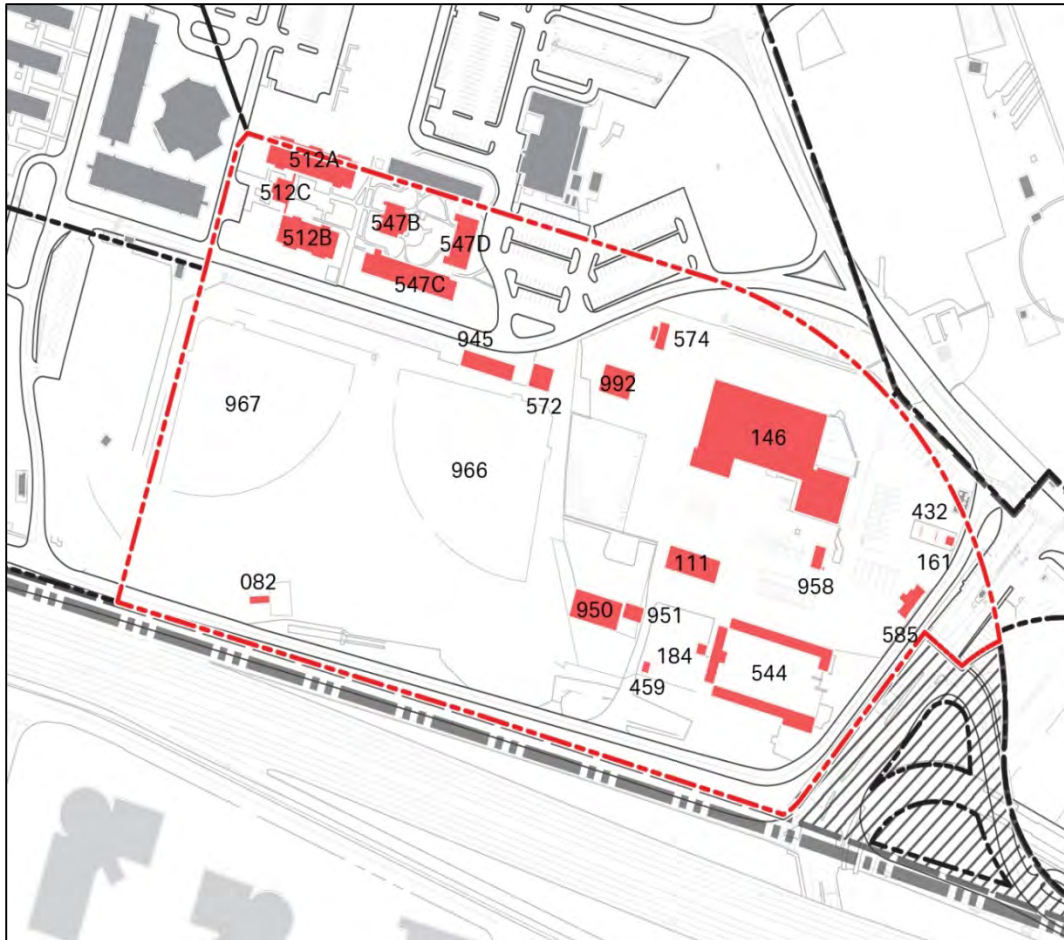
Building	Historic Use	Area (gross square feet)	Year Built	NRHP Eligibility Status	Current Use
951	Insecticide Material Storage	682	1957	No	Mothballed
958	Covered Storage	800	1942	No	Maintenance
966	Softball Field #2	-	1942	No	Recreation
967	Softball Field #1		1942	No	Recreation
992	Vehicle Operations Parking Shed	3,010	1955	No	Storage

Notes:

1. Mothballed means use of the building has ceased, but this does not preclude future use of the building.

NRHP = National Register of Historic Places

Sources: GIS data and Harding ESE 2001a; National Guard Bureau 2009

**Figure 5-1 Map of Parcel 2**

5.2 Environmental Setting

The following sections describe the identified environmental conditions for Parcel 2. These conditions are shown in **Figure 5-2**.

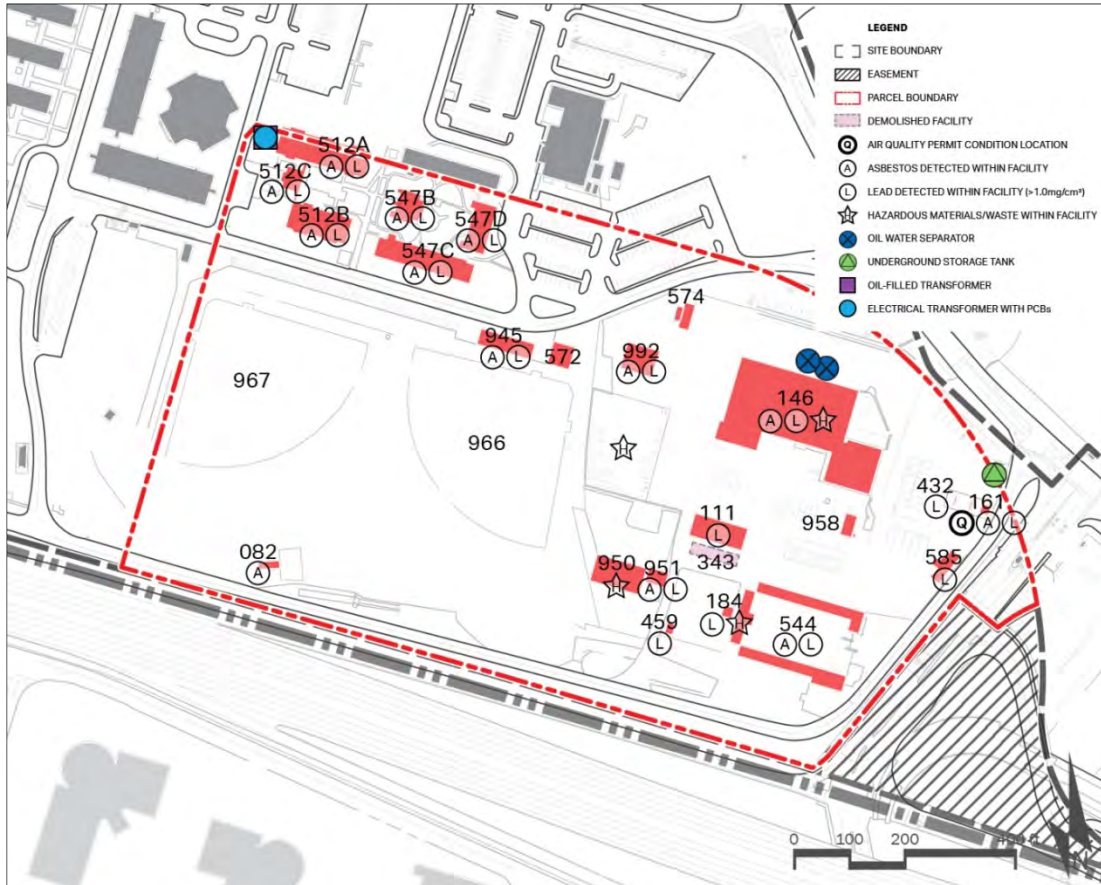


Figure 5-2 Parcel 2 Environmental Conditions

5.2.1 Hazardous Substances

Prior to 1994, hazardous materials and waste were in seven buildings in Parcel 2 (Harding ESE 2001a). Descriptions of these substances by building are shown in **Table 5-2**.

Table 5-2 Former (Prior to 1994) Hazardous Materials and Waste Locations by Building in Parcel 2

Building	Hazardous Materials	Hazardous Waste
82 – Athletic Storage (NASA Exchange)	Unidentified chemicals	None identified
146 – Transportation Garage (California Air National Guard)	Radiator cleaning bath, caustic solution in fresh motor oil, nickel-cadmium batteries, car washing solution, floor cleaner, radiator water, antifreeze, cutting fluid, transmission oil, lube spray, engine starter spray, brake fluid, lubricants, power steering fluid, grease, paint thinner, paint, mineral spirits, alcohol	Battery electrolyte, waste oil, waste hydraulic fluid
161 – Gas Station	Gasoline, diesel	None identified
547B – BEQ (NAR)	Cleaners	None identified
950 – Hazardous Waste 90-day Storage Area	None identified	Flammable liquids, poisons, corrosives, other regulated materials
958 – Vehicle Shed	None identified	Extremely hazardous waste
992 – Fuel Truck Repair Shed	Cleaners, solvents, motor oils, methanol	Waste oil, battery, casings, absorbent material, waste solvents, use lube and gear oil

Source: Harding ESE 2001a

From 1994 to 2000, hazardous materials and waste were in five buildings in Parcel 2 (Harding ESE 2001a). Descriptions of these substances by building are shown in **Table 5-3**.

Table 5-3 1994–2000 Hazardous Materials and Waste Locations by Building in Parcel 2

Building	Hazardous Materials	Hazardous Waste
111- Office/Maintenance	Aerosol spray cans, paint, adhesives, solvent primers, paint thinner, gasoline, floor wax, varnish, sealants	Oily rags, grease, containers with residual solvent and oil, batteries, asbestos contaminated materials, grease, used oil filters
146 – Transportation Garage (CAANG/Army Reserve)	Motor oil, transmission fluid, antifreeze, diesel fuel additive, hydraulic oil, heavy duty grease, carpet cleaner, battery cleaner, greases Freon R134A	Waste oil, contaminated rags, oil filters, aerosol cans, coolant, lacquer thinner, jet fuel, batteries, sodium hypochlorite, oil with halogenated solvents
161 – Ellis Street Gas Station	Gasoline, diesel	None identified
544 – Auto Hobby Shop	Aerosol spray cans, paint varnish, ethylene glycol flammable solvent	Oily rags, solids contaminated with speedy dry, oil, adhesives and resins, oil contaminated water, oil with and without halogenated solvents, absorbent with oil hydraulic oil/fluid, coolant water with antifreeze, PCB light ballasts, grease, welding flux, used oil filters, contaminated kerosene, diesel and gasoline, fluorescent light tubes, grease, used oil filters, brake fluid, batteries, paint contaminated solids, engine degreaser, and motor lubricating, engine, gear and hydraulic oil
950 – Hazardous Waste 90-Day Storage Area	None identified	Flammable liquids, poisons, corrosives, other regulated materials

Source: Harding ESE 2001a

Currently, hazardous materials and waste are in two buildings in Parcel 2—Buildings 184 and 950—as well as in unnumbered buildings south of Building 992. Building 184 contains oil as well as flammable and combustible materials, and miscellaneous hazardous materials below Business Plan quantities (NASA 2018a). Landscaping staff also bring fuel trucks to this building (gas and diesel trucks) (Long, pers. comm., 2018). Building 950 contains several materials for recycling (e.g., ballasts, alkaline batteries, lead acid [sulfuric] batteries), transformer oil, oily solid waste, waste oil, and toxic solid waste (NASA 2018b). One oil storage drum also is at Building 950 (NASA 2018c: Figure 6).

Hazardous materials also are at three unnumbered buildings (i.e., two sheds that contain batteries and spill kits, and one hazardous waste locker for chemicals) in an empty parking lot south of Building 992. The garage portion of Building 146 was built in 1998, and continues to partially function as an automotive service station, managed by the California Air National Guard. Hazardous waste-producing activities include oil, battery, and fuel changes. These activities are conducted with compliant containment below the vehicles, with grated trench drainage. Airplane fuel changes are conducted in a slightly declined room in the event fuel waste is spilled. Oily rags and other associated hazardous waste items are placed into spill kit stations throughout the building, for later collection by the hazardous service company that also collects wastes for NASA. Hazardous waste drums and other hazardous waste receptacles are double contained (e.g., used oil). The garage portion of Building 146 also houses a hazardous waste locker that holds hazardous chemical wastes, used for vehicle maintenance. Hazardous waste drums and other hazardous waste disposals are double-contained and largely confined to one area of the garage.

In addition, some equipment and furniture that was moved from Hangars 2 and 3 is stored in a portion of the Building 146, along with a surplus of uniforms and other items.

One portable gas tank was left outside Building 111, with fuel still inside, and it was not double-contained; however, no hazardous wastes were stored in Building 111. At one time, this building was used for maintenance repairs, but since then it has been cleaned up and is used to store surplus furniture, uniforms, and other items.

5.2.2 CERCLA-Related and Petroleum Contamination

Four CERCLA-related sites are in Parcel 2: Sites 10, 14-South, 15-South, and 16. Each site is described next.

Site 10: The majority of Site 10 is in Parcel 2. VOCs relating to the MEW Superfund Site (south of Highway 101) have contaminated groundwater under much of the Chase Park recreation area, including under Buildings 82, 459, 572, 966, and 967.

Site 14-South: Site 14-South is in Parcel 2, near Building 161. Leakage from two removed gasoline tanks (19 and 20) and piping likely have contributed to groundwater and soil contamination. The tanks were removed in 1986, and monitoring is ongoing. As of 2001, benzene levels were above cleanup goals at 3,000 µg/L. Current benzene contamination related to the former tanks is unknown; the Navy is responsible for continued benzene testing. The Closure Plan (CP) outlines requirements for contaminated soil removal associated with the tanks (PAI/ISSi 2000). Site 14-South is outside the Regional Plume.

Site 15-South: The southern portion of Site 15 is in Parcel 2. Tank 58 is a former oil/water separator that was used as drainage from a former wash rack near Building 544. Although the separator was removed in 1994, analysis of soil in 2001 surrounding former tank 58 showed benzene, toluene, ethylbenzene, and xylene (BTEX) present above cleanup goals (Harding ESE 2001a). Current soil concentrations of BTEX are unknown. The CP outlines requirements for contaminated soil removal associated with the oil/water separator (PAI/ISSi 2000). Groundwater VOCs related to the MEW Superfund Site were detected in the Site 15 area in 2016 (Geosyntec Consultants 2018).

Site 16: Site 16 is in Parcel 2 near Building 146. Potential soil contamination may be present, associated with former sump tank 60 (Harding ESE 2001a). The CP outlines requirements for potential contaminated soil removal associated with the former tank (PAI/ISSi 2000). VOCs associated with the MEW Superfund Site have been detected in groundwater in the area.

5.2.3 Groundwater

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs, which are recorded during monitoring (up to semi-annually) of wells throughout the plume area. **Table 3-4** lists VOC concentration levels from the 2017 Annual Progress Report. In Parcel 2, all nine wells tested in 2016 showed analytes above the reported detection limits.

5.2.4 Storage Tanks

Several USTs are in Parcel 2, including one active tank (see **Table 5-4**). The USTs at Building 146 have been removed. The two USTs at Building 161 were removed in 1986, although active monitoring of these sites continues to occur as part of CERCLA Site 14-South, which currently is under remedial action by the Navy (Harding ESE 2001a; Chuck, pers. comm., 2018b). The tank at Building 544 was removed in 1994, but it was associated with CERCLA Site-15 South. At Building 951, a 500-gallon diesel tank was removed by the Navy in 1994; however, associated soil samples showed concentrations of total petroleum hydrocarbons above cleanup goals (Harding ESE 2001a). In 2006,

the Regional Water Quality Control Board concluded that no further action was needed at the location of Tank 89, based on soil and groundwater sampling results (RWQCB 2006).

Building 432 contains an active 12,000-gallon diesel UST (Harding ESE 2001a), which along with the UST at Building 431 supply fuel to the Public Works Fuel Station at Building 161 (Chuck, pers. comm., 2018b). This tank was upgraded in 1998, to double-walled piping along with upgrades to dispensers (Harding ESE 2001a). NASA will remove the UST at Building 432 when the fuel station closes (Chuck, pers. comm., 2018b).

Table 5-4 Underground Storage Tanks in Parcel 2

Building	Tank/Sump No.	Contents	Size (gallons)	Year Installed	Date Removed	Notes
146	60	Steam cleaning solution	350	Unknown	10/1/1990	Sump, TPHg, TPHd, toluene, xylenes were present in soil at maximum concentrations of 200 mg/kg, 900 mg/kg, 440 µg/kg and 270 µg/kg respectively. Low concentrations of VOCs detected in groundwater well. Area over-excavated, no further investigations recommended.
	116	AV gas	5,000	1933	Unknown	Phase I Basewide Tank Closure and Remaining UST Sites, closure granted by RWQCB 8/8/2000.
161	19	Gasoline	5,000	1953	10/1/1986	Part of CERCLA Site 14-South, active monitoring and remediation at this site
	20	Diesel	5,000	1953	10/1/1986	Part of CERCLA Site 14-South, active monitoring and remediation at this site
432	71	Diesel	12,000	1986	Active	Also referred to as Tank 432. Tank upgraded in 1998. Tanks 431 and 432 supply fuel (unleaded gasoline and diesel) to Ellis Street Public Works Service Station.
544	58	Oily water	300	Unknown	4/12/1994	Oil water separator, reportedly removed, related to active investigation at CERCLA Site 15-South.
951	89	Diesel	500	1955	4/15/1994	TPHd present in soil at concentrations above cleanup goals. Tank removed by the Navy.

Notes:

Tank Numbers are from Tetra Tech 1994 and PRC 1994.

Source: Harding ESE 2001a:Table 3

A formal closure letter for UST 57 (Building 544) was transmitted to NASA's BRAC program by the Regional Water Quality Control Board (RWQCB) in July 2003. The letter formalized that no further action was necessary regarding closure of former UST 57 (RWQCB 2003). In 2013, the RWQCB transmitted a formal letter stating that former UST tank 58 required no further action. However, the RWQCB listed several conditions and requirements because of residual subsurface petroleum. The following conditions and restrictions apply to the site (Building 544), associated with the former UST (RWQCB 2013):

1. **No residential land use:** The site cannot support residential use because of potentially unacceptable direct contact risk from residual petroleum contamination in shallow soil (less than 10 feet below ground surface).
2. **No grading, excavation, or subsurface activities without a soil management plan:** Any work must include procedures for proper notification, handling, and disposal of any potentially contaminated soil or groundwater encountered during construction or removed from the site. Current and future site workers, tenants, and landowners must be notified of the soil management requirements for the property.
3. **Notify RWQCB about any land/groundwater use change:** The RWQCB must be notified in writing about any proposed changes in future land or groundwater use at the site. Formal RWQCB concurrence may be required.
4. **Decommission monitoring wells:** Any monitoring wells that will no longer be used must be properly destroyed, pursuant to requirements of the Santa Clara Valley Water District (SCVWD). For information regarding these requirements, please contact the Santa Clara Valley Water District at 408-265-2600. Documentation of well destruction needs to be submitted to the RWQCB.

5.2.5 Oil Water Separators

Potentially two oil water separators and one sump are in Parcel 2 (see **Table 5-5**). One 4,500-gallon oil water separator reportedly was removed at Building 585, but its status is unknown (Chuck, pers. comm., 2018b; Harding ESE 2001a). One active oil water separator and a sump (Sump 9) also are at Building 146, which are used by the California Air National Guard (Chuck, pers. comm., 2018b; Harding ESE 2001a). A 300-gallon oil water separator also was at Building 544, but it was removed in 1994 (Harding ESE 2001a). Contamination related to this oil water separator is described under Site 15-South in Section 5.2.2, CERCLA-Related and Petroleum Contamination.

Table 5-5 Oil Water Separators/Sumps in Parcel 2

Building	Tank/Sump No.	Contents	Size (Gallons)	Year Installed	Date Removed	Notes
146	126	Oily water	Unknown	Unknown	Active	Sump (Sump #9), unknown regulatory status
	127	Oily water	Unknown	Unknown	Inactive	Oil water separator, used by California Air National Guard, was removed 10 years ago and covered with cement
585	136	Oily water	4,500	Unknown	Inactive	Oil water separator, reportedly removed, unknown status

Notes:

Tank Numbers are from Tetra Tech 1994 and PRC 1994.

Source: Harding ESE 2001a:Table 3

5.2.6 Asbestos

Asbestos is categorized in one of two ways: friable or non-friable material. Friable ACM can be pulverized by hand. Non-friable ACM must undergo destructive forces before fiber release can occur. For most of the buildings in Parcel 2, an AHERA-style asbestos survey was conducted in 2001, to determine the locations of accessible and, to the extent feasible, inaccessible friable and non-friable ACM. The inspections varied by building as to whether interior and/or exterior materials were

reviewed. **Table 5-6** summarizes when the buildings in Parcel 2 were sampled for asbestos, what materials were found to contain friable or non-friable asbestos, and what materials were assumed to contain asbestos.

Table 5-6 Asbestos Survey Results for Buildings in Parcel 2

Building Number	Building Name	Year Surveyed	Asbestos Detected in These Friable (or Jacketed Friable) Materials	Asbestos Detected in These Non-Friable Materials	Materials Assumed to Contain Asbestos
082	General/Athletic Storage	2001	None	Roofing Material	Not Applicable
111	Transportation Storage	2001	None	None	Not Applicable
146	Transportation Garage	2001/2005	Pipe elbows, pipe insulation	Mastic, roofing material, HVAC vibration cloth, miscellaneous	Pipe, HVAC insulation, tank cover, wallboard, mastic, vibration joint cloth, Fire door, transite, interior paneling, transite panel, transite pipe
161	Service Station/Fuel Island 1 & 2	2001	None	Roofing tar, transite panel	Not Applicable
184	Maintenance Storage	2001	None	None	None
343	Public Works Riggers Shop	2001	None	Floor tile, mastic, roofing material	Not Applicable
432	Bulk Loading/Unloading Unleaded Storage Tank	2001	None	None	None
459	Recreation Storage	2001	None	None	None
512A	Enlisted Barracks	2001	None	Floor tile, mastic, roofing material, transite panel	Fire door
512B	Enlisted Barracks	2001	None	Ceiling tile adhesive, floor tile, mastic, roofing material	Fire Door
512C	Enlisted Barracks	2001	Tank insulation	Roofing material	Not applicable
544	Auto Hobby Shop	2001	None	Mastic	Not applicable
547B	NASA Exchange Service Building	2001	Spray applied acoustical ceiling material	Floor covering, mastic, wall-board	Fire door
547C	BEQ	2001	Spray applied acoustical ceiling material	Mastic, wall-board, roofing material	Fire door

Table 5-6 Asbestos Survey Results for Buildings in Parcel 2

Building Number	Building Name	Year Surveyed	Asbestos Detected in These Friable (or Jacketed Friable) Materials	Asbestos Detected in These Non-Friable Materials	Materials Assumed to Contain Asbestos
547D	NASA Exchange Lodge	2001	Spray applied acoustical ceiling material	Mastic, wall-board, roofing material	Not applicable
572	Racquetball Courts	2001	None	None	None
574	Storage Warehouse B	2001/2005	None	None	None
585	Vehicle Wash Platform/Facility	2001	None	None	None
945	Athletic Field Dressing Rooms	2001	None	Roof- penetration mastic	Not applicable
950	Hazardous Material Storage	2001	None	None	None
951	Insecticide Material Storage	2001	None	Floor tile, mastic, roofing material	Not applicable
958	Covered Storage	2001	None	None	None
966	Softball Field	2001	None	None	None
967	Softball Field	2001	None	None	None
992	Vehicle Operations Parking Shed	2001/2005	None	Wall-Board	None

Notes:

Not Applicable – no mention of these materials was contained in the survey report.

Sources: Benchmark 2001 (asbestos reports); National Guard Bureau 2009

Sampling of the bathroom walls in Building 343 was conducted in 2009. The results indicated asbestos was present in the joint compound in the drywall of the bathroom (Consolidated Safety Services 2010). In 2016, pre-demolition bulk sampling of the drywall/joint compound and vapor barrier in Building 343 was conducted. The results indicated asbestos was detected in both the joint compound and vapor barrier (ERT 2016a). In late 2016, asbestos materials were removed from Building 343, in preparation for demolition. Following removal, laboratory analysis reported that asbestos was not detected above the NASA Ames standard in the final air clearance samples (ERT 2016a).

5.2.7 Polychlorinated Biphenyls

Two facilities above the DHS-regulated concentration of 5 ppm PCBs are in Parcel 2. Three transformers at Building 146 were tested for PCB concentrations in 1995 and 1996. One was found to contain 8 and 6 ppm PCBs (in 1995 and 1996, respectively) (Harding ESE 2001a). These transformers are no longer present (NASA 2018d; National Guard Bureau 2009). In addition, one transformer (T-32) at Building 512A was tested in 1995, 1996, 1997, and 1999, and was found to contain 51, 469, 409, and 580 ppm PCBs, respectively (Harding ESE 2001a). This transformer still is active and known to contain PCBs (NASA 2018d).

5.2.8 Lead-based Paints and Lead in Soils

Surveys were conducted in 2001 to determine the presence of LBP at most of the buildings in Parcel 2. Visual inspections, sampling, and analysis were conducted on inside and outside components of buildings throughout the parcel. Paint chip samples and assays were taken using an X-ray fluorescence measurement instrument. Levels of lead above 1.0 mg/cm² in residual LBPs are considered to be above USEPA actionable levels and would require regulatory compliance with CAL OSHA and CDPH standards before renovation or demolition (USEPA 2018; CDPH 2014).

In 2017, Building 343 (the former Public Works Riggers Shop) was demolished. Applicable regulatory oversight was conducted before and while LBP was removed from the buildings before demolition (ERT 2016a).

Table 5-7 summarizes where lead was detected above USEPA and DHS levels, on or within buildings in Parcel 2.

Surface soil samples were collected from the perimeter of several buildings in the Study Area in 1993. **Table 5-7** shows the results of any sampling done around buildings in Parcel 2 and notes whether any samples were found to have lead detected above USEPA Region 9 residential PRGs or industrial PRGs. Of the buildings surveyed in Parcel 2, none were found to exceed USEPA PRGs. In 2003, soil samples were taken at 10 buildings at NASA Ames, where lead-affected soils were identified or suspected, two of which were Buildings 512C and 547B in Parcel 2, although these buildings were not surveyed in 1993. The results of soil sampling indicated that lead levels were below the NASA risk-based screening level (RBSL) of 200 milligrams per kilogram (mg/kg) at both buildings, and therefore soil at these buildings does not require additional investigation or removal (PAI/ISSi 2003).

5.2.9 Indoor Air Quality/Vapor Intrusion

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs beneath the Study Area. These VOCs can move from the ground to indoor and ambient air via the vapor intrusion pathway and can result in long-term human health effects. **Table 3-6** lists the buildings that have been sampled as part of the MEW Superfund Site cleanup activities following USEPA's 2010 Vapor Intrusion ROD Amendment. The five buildings that have been sampled for indoor air quality in Parcel 2 show concentrations of the seven chemicals of concern to be below USEPA's commercial indoor air cleanup levels from the 2010 Vapor Intrusion ROD Amendment.

5.2.10 Air Quality

An air emissions inventory of all sources of air pollutants throughout the ARC property was conducted in 2011. The inventory was split into three sources of air pollutants: combustion sources, evaporative loss sources, and miscellaneous sources (BAAQMD Undated). In the inventory, 279 air emissions sources throughout the ARC were identified (BAAQMD Undated). These sources included external combustion sources at Buildings 146 and 945; Building 146 contained four space heaters and Building 945 contained a water heater (BAAQMD Undated). No internal combustion sources or miscellaneous sources were identified in the Study Area (BAAQMD Undated). Three evaporative loss sources are facility-wide: solvent wipe cleaning, coating operations, and laser seeding. One Synthetic Minor Operating Permit condition (#8790) is related to facility-wide laser seeding, requiring a limit of 200 gallons during any consecutive 12-month period or 4 gallons during any one day. One evaporative loss source specific to Parcel 2 also exists, gasoline dispensing at Building 161. One permit condition (#7523) is related to this source; gasoline throughput is not to exceed 400,000 gallons in any consecutive 12-month period.

Table 5-7 Lead-based Paint and Lead in Soils Survey Results for Buildings in Parcel 2

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm²)	Lead Detected Exteriorly (>1.0mg/cm²)	Lead in Soil Above Residential/ Industrial PRG
82	General Athletics/Storage	2001	Lead-Based Paint was not identified on any building components.	Lead-Based Paint was not identified on any building components.	No/No
111	Transportation Storage	2001	Corrugated Walls Gray and Yellow	Corrugated Walls, Sliding Door, Door Frame, Window Frames, Sills, Mullions and Flashing Over Window	Not Sampled/Not Sampled
146	Transportation Storage	2001/ 2005	Room 101 – Double Doors, Building Supports, Rollup Doors, Rollup Door Frames Room 130 – Window Wall Units, Support Posts, Door Casing, Kick Panel, Building Support, Trust, High Bay Room 104 – Rollup Doors, Rollup Door Frames, Double Doors High Bay Room 105 – Rollup Door, Rollup Door Frame Room 107 – Building Support, Ballard High Bay 114 – Door High Bay 128 – Support Post, Kick Panel, Window Wall Unit High Bay 129 – Window Wall Nut Hallway 131 – Door Casing, Window Wall Unit High Bay 134 – Window Wall Unit	Rollup Doors, Rollup Door Frames, Doors, Door Casings, Window Wall Units, Red Curb, Kick Panels, Skylights	Not Sampled/Not Sampled
161	Service Station/Fuel Island 1 and 2	2001	Outdoor Structure; Not Applicable	Center Concrete Island, Pump Umbrellas, Steel Beams supporting umbrella, Ceiling/Roof under umbrella	No/No
184	Maintenance Storage	2001	Lead-Based Paint was not identified on any interior building components.	Door, Corrugated Walls, Bracket, Foundation, Base Sealant.	Not Sampled/Not Sampled
432*	Bulk Loading/ Unleaded Diesel Storage Tank	2001	Not Applicable (outdoor structures)	Parking Ballard's, Safety Wall Yellow, Fuel Station Foundation, Fuel Pump, Driver Safety Stripping	Not Sampled/Not Sampled

Table 5-7 Lead-based Paint and Lead in Soils Survey Results for Buildings in Parcel 2

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm²)	Lead Detected Exteriorly (>1.0mg/cm²)	Lead in Soil Above Residential/ Industrial PRG
459	Recreation Storage	2001	Lead-Based Paint was not identified on any interior building components.	Doors, Roof Support, Brackets, Foundations, Corrugated Walls	Not Sampled/Not Sampled
512A	Enlisted Barracks	2001	Lead-Based Paint was not identified on any interior building components.	Handrail	No/No
512B	Enlisted Barracks	2001	Room 220 Door	Lead-Based Paint was not identified on any exterior building components.	No/No
512C	Enlisted Barracks	2001	Mechanical Room Exterior Door	Lead-Based Paint was not identified on any exterior building components.	Not Sampled/Not Sampled
544	Auto Hobby Shop	2001	Covered Vehicle Parks – Parking Ballard, Spray Booth Walls, Courtyard Yellow Parking Bump, Foundation, Tool Room Floor	Gate Pole, Foundation	No/No
547B	NASA Exchange service building	2001	Common Area Door Frame	Lead-Based Paint was not identified on any exterior building components.	Not Sampled/Not Sampled
547C	BEQ	2001	Bathroom Tile Walls	Lead-Based Paint was not identified on any exterior building components.	No/No
547D	NASA Exchange Lodge	2001	Bathroom Tile Walls	Lead-Based Paint was not identified on any exterior building components.	Not Sampled/Not Sampled
572	Racquetball Courts	2001	Lead-Based Pain was not identified on any building components.	Lead-Based Paint was not identified on any building components.	No/No
574	Storage Warehouse B	2001/ 2005	Lead-Based Paint was not identified on any building components	Lead-Based Paint was not identified on any building components	Not Sampled/Not Sampled
585	Vehicle Wash Platform/Facility	2001	Outdoor Structures. Not Applicable.	Parking Ballard	Not Sampled/Not Sampled
945	Athletic Field Dressing Rooms	2001	Safety Yellow Paint	Siding, Window Jambs, Window Sills, Eaves, Downspouts, Door Molding Fascia, Water Pipe	Not Sampled/Not Sampled
950	Hazardous Material Storage	2001	Lead-Based Paint was not identified on any building components.	Lead-Based Paint was not identified on any building components.	Not Sampled/Not Sampled

Table 5-7 Lead-based Paint and Lead in Soils Survey Results for Buildings in Parcel 2

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm²)	Lead Detected Exteriorly (>1.0mg/cm²)	Lead in Soil Above Residential/ Industrial PRG
951	Insecticide Material Storage	2001	Storage Yellow Curbing	Door, Door Frame, Yellow Curbing, Vent, Ladder, Ladder Support, Fascia/Flashing.	Not Sampled/Not Sampled
958	Covered Storage	2001	Lead-Based Paint was not identified on any building components.	Lead-Based Paint was not identified on any building components.	Not Sampled/Not Sampled
966	Softball Field #2	2001	Lead-Based Paint was not identified on any building components.	Lead-Based Paint was not identified on any building components.	Not Sampled/Not Sampled
967	Softball Field #1		Lead-Based Paint was not identified on any building components.	Lead-Based Paint was not identified on any building components.	Not Sampled/Not Sampled
992	Vehicle Operations Parking Shed	2001/ 2005	Lead-Based Paint was not identified on any interior building components.	Building Supports	Not Sampled/Not Sampled

Notes:

* Buildings 431 and 432 were tested together.

* National Guard Bureau 2009 Report only lists presence of lead as "positive," or "negative," and not areas or detection amounts.

Sources: Benchmark 2001 (lead reports); Harding ESE 2001a:Table 5; National Guard Bureau 2009

6. Findings for Parcel 3

6.1 History and Current Use

Three of the buildings in Parcel 3 were constructed in the late 1940s, and the fourth was built in 1984. None of the buildings in Parcel 3 are listed in the NRHP. Historic uses of the buildings in Parcel 3 have included administrative offices and recreational swimming-related facilities. The majority of the buildings in Parcel 3 continue to be used for administrative offices and recreational swimming. One former administrative building currently is used for housing. **Table 6-1** summarizes key information for the buildings in Parcel 3, including historic use, size of the building, year constructed, and current use. **Figure 6-1** shows Parcel 3 and the buildings within it. **Appendix A** includes a photo of each of the buildings in Parcel 3.

Table 6-1 Summary of Historic and Current Use of Buildings in Parcel 3

Building	Historic Use	Area (gross square feet)	Year Constructed	National Register of Historic Places Eligibility Status	Current Use
107	Navy ROICC Administration Building	1,823	1948	No	Housing
108	Swimming Pool	5,025	1948	No	Recreation
109	Swimming Pool Dressing Rooms	5,012	1948	No	Recreation
555	Administration Building	5,201	1984	No	Office

Sources: GIS data and Harding ESE 2001a

6.2 Environmental Setting

The following sections describe the identified environmental conditions for Parcel 3. These conditions are shown in **Figure 6-2**.

6.2.1 Hazardous Substances

Prior to 1994, hazardous materials possibly consisting of gasoline, batteries, solvents, and cleaners, and hazardous waste possibly consisting of waste oil and solvents were at Building 555 in Parcel 3 (Harding ESE 2001a). From 1994–2000, hazardous materials consisting of swimming pool chemicals (i.e., sodium hypochlorite, muriatic acid, carbon dioxide, and soda ash) were at Building 109 (Harding ESE 2001a). Currently, hazardous materials related to the swimming pool (Building 108), including carbon dioxide, miscellaneous corrosive materials, hazardous materials, oxidizing materials, and a 500-gallon tank of sodium hypochlorite are at Building 109 (NASA 2017c). No other buildings in Parcel 3 are known to contain hazardous materials (Chuck, pers. comm., 2018b).

6.2.2 Storage Tanks

One active 500-gallon AST is at Building 109 (Tank 135), containing sodium hypochlorite that is used in the swimming pool for chlorination (Harding ESE 2001a). Two USTs (86A and B) for gasoline and diesel previously were near Building 107, but they were removed in 1993 (Harding ESE 2001a).

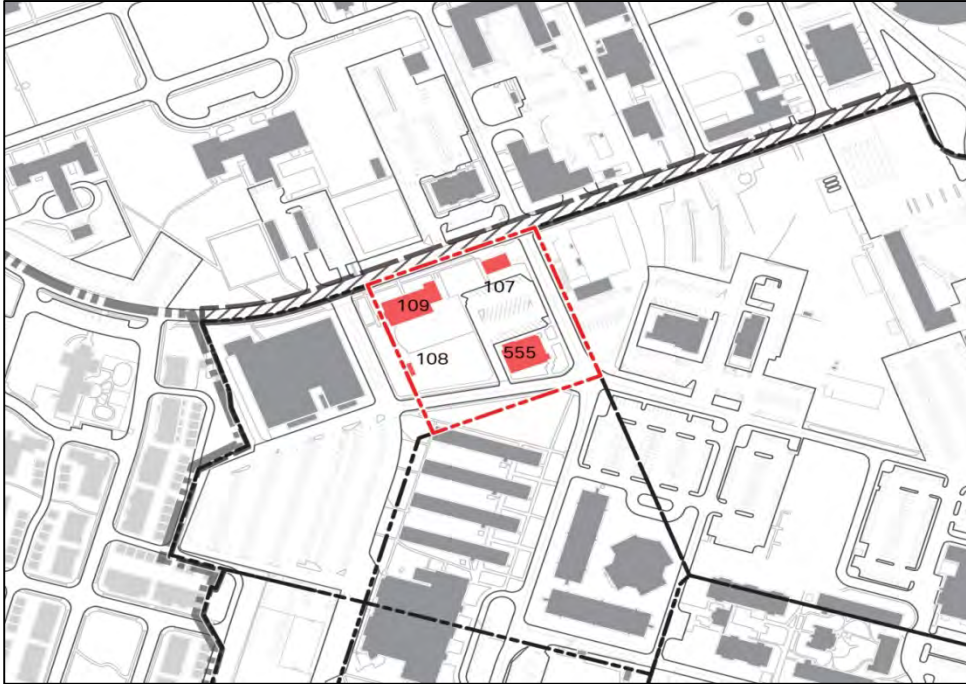


Figure 6-1 Map of Parcel 3

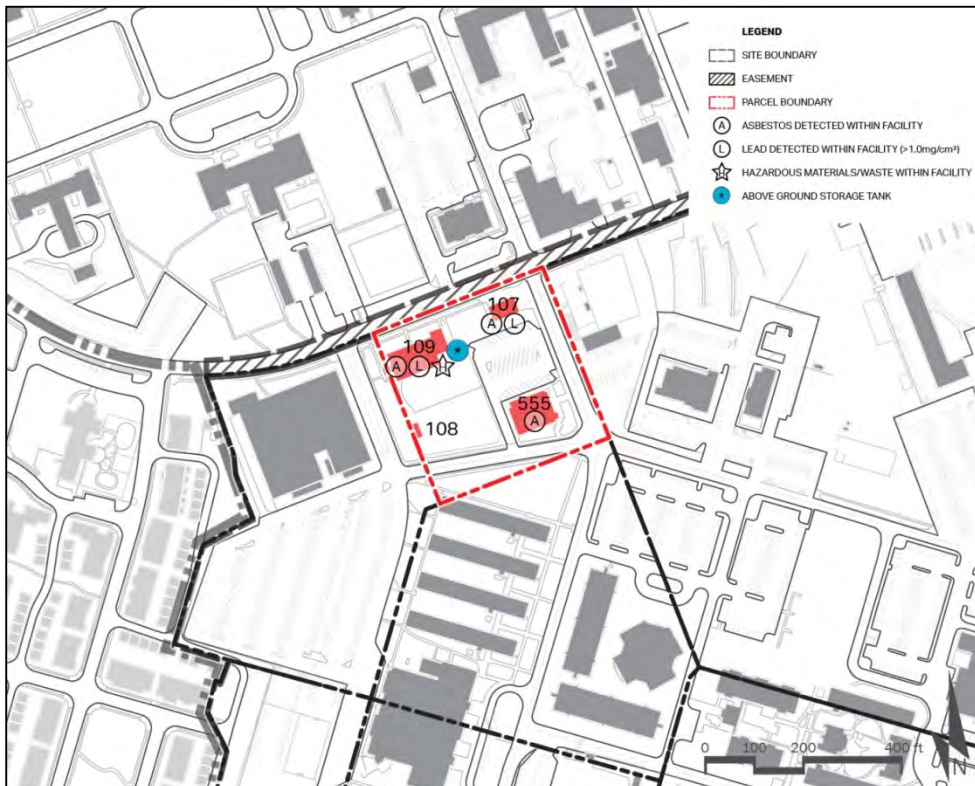


Figure 6-2 Parcel 3 Environmental Conditions

6.2.3 Asbestos

Asbestos is categorized in one of two ways: friable or non-friable material. Friable ACM can be pulverized by hand. Non-friable ACM must undergo destructive forces before fiber release can occur. For most of the buildings in Parcel 3, an AHERA-style asbestos survey was conducted in 2001, to determine the locations of accessible and, to the extent feasible, inaccessible friable and non-friable ACM. The inspections varied by building as to whether interior and/or exterior materials were reviewed. **Table 6-2** summarizes when the buildings in Parcel 3 were sampled for asbestos, what materials were found to contain friable or non-friable asbestos, and what materials were assumed to contain asbestos. In 2016, asbestos-containing roof sealant on Building 555 was removed (ERT 2016b).

Table 6-2 Asbestos Survey Results for Buildings in Parcel 3

Building Number	Building Name	Year Surveyed	Asbestos Detected in These Friable (or Jacketed Friable) Materials	Asbestos Detected in These Non-Friable Materials	Materials Assumed to Contain Asbestos
107	Navy ROICC Administration Building	2001	None	Floor-mastic, roofing material, wall-board, HVAC duct-joint compound	Not applicable
108	Swimming Pool	2001	None	None	None
109	Swimming Pool Dressing Rooms	2001	Paper insulation, pipe elbows, pipe insulation	Floor-mastic, floor tile, roofing material	Fire door
555	Administration Building	2001	None	Ceiling-mastic, floor-mastic, miscellaneous	Not applicable

Notes:

Not Applicable – no mention of these materials was contained in the survey report.

Sources: Benchmark 2001 (asbestos reports)

6.2.4 Lead-based Paints and Lead in Soils

Surveys were conducted in 2001, to determine the presence of LBP at all of the buildings in Parcel 3. Visual inspections, sampling, and analysis were conducted on inside and outside components of buildings throughout the parcel. Paint chip samples and assays were taken using an X-ray fluorescence measurement instrument. Levels of lead above 1.0mg/cm² in LBPs are considered to be above USEPA actionable levels and would require regulatory compliance with CAL OSHA and CDPH standards before renovation or demolition (USEPA 2018; CDPH 2014). **Table 6-3** summarizes where lead was detected above USEPA and DHS levels, on or within buildings in Parcel 3.

Surface soil samples were collected from the perimeter of several buildings in the Study Area in 1993. **Table 6-3** shows the results of any sampling done around buildings in Parcel 3 and notes whether any samples were found to have lead detected above USEPA Region 9 residential PRGs or industrial PRGs. None of the buildings surveyed in Parcel 3 were found to exceed USEPA PRGs.

Table 6-3 Lead-based Paint and Lead in Soil Survey Results for Buildings in Parcel 3

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm²)	Lead Detected Exteriorly (>1.0mg/cm²)	Lead in Soil Above Residential/ Industrial PRG
107	Navy ROICC Administration Building	2001	Lead-Based Paint was not identified on any interior building components.	Window Sill	No/No
108	Swimming Pool	2001	Lead-Based Paint was not identified on any building components.	Lead-Based Paint was not identified on any building components.	Not Sampled/Not Sampled
109	Swimming Pool Dressing Rooms	2001	Lead-Based Paint was not identified on any interior building components	Door, Door Case/Trim, Yellow Threshold, Front Support Column, Main Entrance Ceiling, Men's Shower Window Sill.	No/No
555	Administration Building	2001	Lead-Based Paint was not identified on any building components	Lead-Based Paint was not identified on any building components	No/No

Sources: Benchmark 2001 (lead reports); Harding ESE 2001a:Table 5

6.2.5 Indoor Air Quality/Vapor Intrusion

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs beneath the Study Area. These VOCs can move from the ground to indoor and ambient air via the vapor intrusion pathway and can result in long-term human health effects. **Table 3-6** lists the buildings that have been sampled as part of the MEW Superfund Site cleanup activities following USEPA's 2010 Vapor Intrusion ROD Amendment. The one building that has been sampled for indoor air quality in Parcel 3 showed concentrations of the seven chemicals of concern to be below USEPA's commercial indoor air cleanup levels from the 2010 Vapor Intrusion ROD Amendment.

6.2.6 Air Quality

An air emissions inventory of all sources of air pollutants throughout the ARC property was conducted in 2011. The inventory was split into three sources of air pollutants: combustion sources, evaporative loss sources, and miscellaneous sources (BAAQMD Undated). In the inventory, 279 air emissions sources throughout the ARC were identified (BAAQMD Undated). These sources included external combustion sources at Building 109—a pool heater and a water heater (BAAQMD Undated). No internal combustion sources or miscellaneous sources were identified in the Study Area (BAAQMD Undated). Three evaporative loss sources are facility-wide: solvent wipe cleaning, coating operations, and laser seeding. One Synthetic Minor Operating Permit condition (#8790) is related to facility-wide laser seeding, requiring a limit of 200 gallons during any consecutive 12-month period or 4 gallons during any one day.

7. Findings for Parcel 4

7.1 History and Current Use

The greater part of Parcel 4 was built in the 1950s and 1970s. None of the buildings in Parcel 4 are listed in the NRHP. The majority of buildings in Parcel 4 historically were enlisted men's barracks. Historic use of the remaining buildings was administrative, recreational and utility-related. Current uses of the buildings include office space, maintenance, recreation courts, and storage. **Table 7-1** summarizes key information for the buildings in Parcel 4, including historic use, size of the building, year constructed, and current use. **Figure 7-1** shows Parcel 4 and the buildings within it. **Appendix A** includes a photo of each of the buildings in Parcel 4. One building in Parcel 4, Building 050 was demolished in 2011.

Table 7-1 Summary of Historic and Current Use of Buildings in Parcel 4

Building	Historic Use	Area (gross square feet)	Year Constructed	National Register of Historic Places Eligibility Status	Current Use
152	Conference and Administration Center	37,134	1953	No	Storage
153	Enlisted Men's Barracks	15,785	1953	No	Office
154	Enlisted Men's Barracks	15,785	1953	No	Office
155	Enlisted Men's Barracks	16,013	1953	No	Office
156	Enlisted Men's Barracks	15,785	1953	No	Office
533	Chase Park Restroom	448	1971	No	Storage
534	Barbeque Shelter	295	1971	No	Barbeque Shelter
590	12 KV Substation Switchgear	317	1986	No	Maintenance
964	Basketball Courts	-	1957	No	Basketball Courts
965	Volleyball Courts	-	1957	No	Volleyball Courts

Sources: GIS data and Harding ESE 2001a

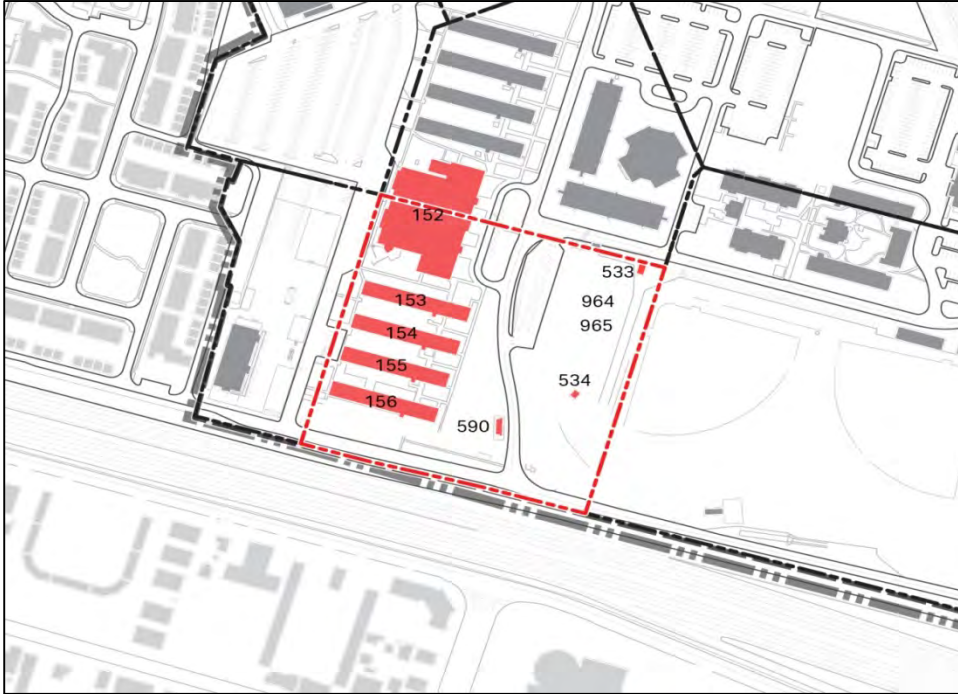


Figure 7-1 Map of Parcel 4

7.2 Environmental Setting

The following sections describe the identified environmental conditions for Parcel 4. These conditions are shown in **Figure 7-2**.

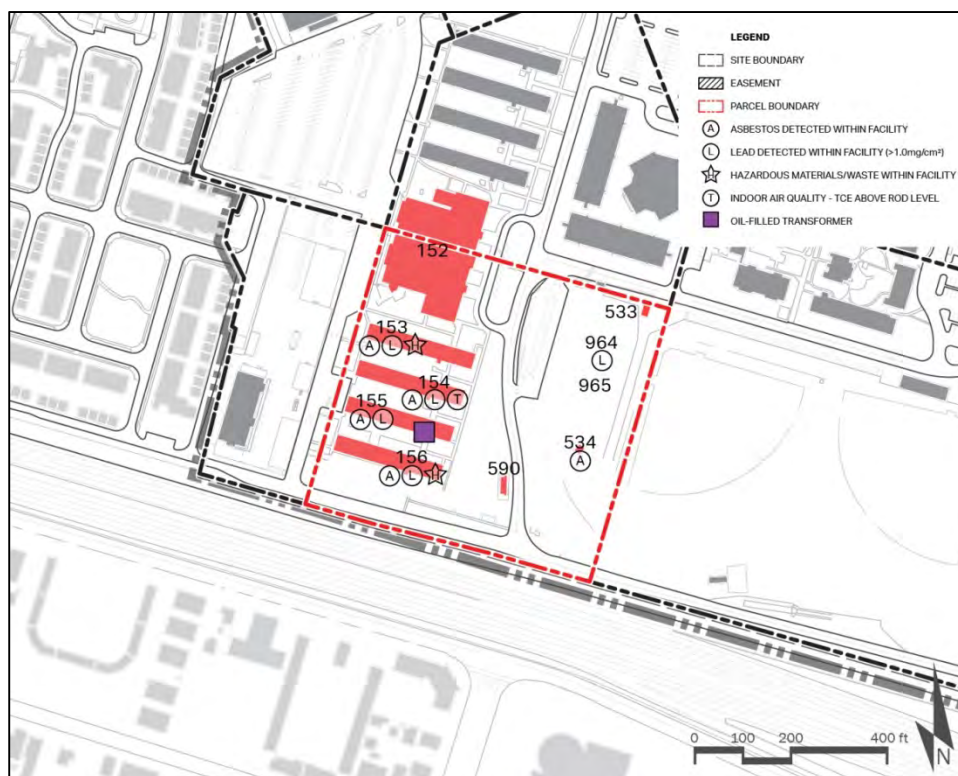


Figure 7-2 Parcel 4 Environmental Conditions

7.2.1 Hazardous Substances

Prior to 1994, no hazardous materials or substances were in buildings in Parcel 4 (Harding ESE 2001a). However, from 1994 to 2000, hazardous materials and substances were in two buildings in Parcel 4, Buildings 152 and 156 (Harding ESE 2001a). Building 152 contained hazardous materials consisting of decontamination kits with ethanol and hazardous waste consisting of filters containing silver and chromium as well as batteries (Harding ESE 2001a). Building 156 contained hazardous materials consisting of acetone, adhesive, paint, wood stain, and wood patch, as well as hazardous waste consisting of contaminated diesel and gasoline, hydraulic oil, dry cleaning solvents (with naphthalene), grease, and mercury contaminated waste (Harding ESE 2001a). Currently, Buildings 153 and 156 in Parcel 4 contain hazardous materials. Building 153 contains hazardous materials such as resins, gases and oils, coatings and adhesives, and cleaning agents (NASA 2017a). In addition, a variety of hazardous materials also are kept at Building 156, including glues, epoxies, bismuth Telluride pellets, removing liquids, sealants, oils, and helium (NASA 2017b). One oil-filled electrical transformer (T-164) also is in Building 155 in Parcel 3 (NASA 2018d).

7.2.2 CERCLA-Related and Petroleum Contamination

Site 10 is the only CERCLA-related site in Parcel 4. Site 10 extends west from Parcel 2 to the eastern portion of Parcel 4. VOCs related to the MEW Superfund Site have contaminated groundwater beneath much of the recreation area, including Buildings 533, 534, 590, 964, and 965.

7.2.3 Groundwater

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs, which are recorded during monitoring (up to semi-annually) of wells throughout the plume area.

Table 3-4 lists VOC concentration levels from the 2017 Annual Progress Report. In Parcel 4, all four wells that were tested in 2016 showed analytes above the reported detection limits.

7.2.4 Asbestos

Asbestos is categorized in one of two ways: friable or non-friable material. Friable ACM can be pulverized by hand. Non-friable ACM must undergo destructive forces before fiber release can occur. For most of the buildings in Parcel 4, an AHERA-style asbestos survey was conducted in 2001 or 2002, to determine the locations of accessible and, to the extent feasible, inaccessible friable and non-friable ACM. The inspections varied by building as to whether interior and/or exterior materials were reviewed. **Table 7-2** summarizes when the buildings in Parcel 4 were sampled for asbestos, what materials were found to contain friable or non-friable asbestos, and what materials were assumed to contain asbestos.

Table 7-2 Asbestos Survey Results for Buildings in Parcel 4

Building Number	Building Name	Year Surveyed	Asbestos Detected in These Friable (or Jacketed Friable) Materials	Asbestos Detected in These Non-Friable Materials	Materials Assumed to Contain Asbestos
153	Administration Building	2002	None	None	Fire door
154	Administration Building	2002	None	Sink undercoating	Fire door
155	Administration Building	2002	Pipe elbows, pipe insulation	Floor tile, mastic, roofing material, sink undercoating	Fire door
156	Administration Building	2002	Pipe elbows, pipe insulation	Floor tile, mastic	Fire door
534	BBQ Shelter	2001	None	None	Transite shingles
964	Basketball court	2001	None	None	None
965	Volleyball court	2001	None	None	None

Notes:

Buildings 152, 533, and 590 have not been surveyed for asbestos.

Sources: Benchmark 2001 (asbestos reports)

Pre-demolition bulk sampling of the drywall/joint compound, floor tile, and baseboard mastics was conducted at Building 153 in Rooms 110, 111a, 113, 115, 117, and 119 in 2016. No asbestos was detected in these materials (ERT 2016c). In addition, two samplings have been conducted in Building 156. In 2016, testing of Room 205's flooring-mastic materials was conducted and found not to be an ACM (ERT 2015b). In 2017, the floor tile, floor tile-mastic, and ceramic tile and grout in Rooms 210–222 and adjacent hall of the second floor of Building 156 were removed. Following removal, laboratory analysis reported that asbestos was not detected in the final air clearance samples (ERT 2017b).

7.2.5 Lead-based Paints and Lead in Soils

Surveys were conducted in 2001, to determine the presence of LBP at a majority of the buildings in Parcel 4. Visual inspections, sampling, and analysis were conducted on inside and outside components of buildings throughout the parcel, with the exception of Building 533, a public restroom. Paint chip samples and assays were taken using an X-ray fluorescence measurement instrument.

The second floor of Building 156 underwent lead abatement in 2017. Applicable regulatory oversight and compliance was conducted before and during removal (ERT 2017b). LBP sampling reports for the Conference and Administration Center (Building 152) were not found.

Levels of lead above $1.0\text{mg}/\text{cm}^2$ in residual LBPs are considered to be above USEPA actionable levels and would require regulatory compliance with CAL OSHA and CDPH standards before renovation or demolition (USEPA 2018; CDPH 2014). **Table 7-3** summarizes where lead was detected above USEPA and DHS levels, on or within buildings in Parcel 4.

Surface soil samples were collected from the perimeter of several buildings in the Study Area in 1993. **Table 7-3** shows the results of any sampling done around buildings in Parcel 4 and notes whether any samples were found to have lead detected above USEPA Region 9 residential PRGs or industrial PRGs. Of the buildings surveyed in Parcel 4, no buildings were found to exceed USEPA PRGs for both residential and industrial. In 2003, soil samples were taken at 10 buildings at NASA Ames where lead-affected soils were identified or suspected, one of which was Building 533 in Parcel 4, although this building was not surveyed in 1993. The results of soil sampling indicated that the lead levels were below the NASA RBSL of $200\text{ mg}/\text{kg}$ at Building 533, and therefore soil at this building does not required additional investigation or removal (PAI/ISSi 2003).

Table 7-3 Lead-based Paint and Lead in Soil Survey Results for Buildings in Parcel 4

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly ($>1.0\text{mg}/\text{cm}^2$)	Lead Detected Exteriorly ($>1.0\text{mg}/\text{cm}^2$)	Lead in Soil Above Residential/Industrial PRG
152	Conference and Administration Center	2001	NA	NA	No/No
153	Administration Building	2001–2002	Hallway: Handrail Stairwell: Wall	Downspout, Door Frame, Fixed Window Panel, Window Sill	No/No
154	Administration Building	2001	Basement Stairwell: Handrail Stairwell at Room 121: Door Frame	Door Frame, Fixed Window Panel, Window Sill, Stair Riser	No/No

Table 7-3 Lead-based Paint and Lead in Soil Survey Results for Buildings in Parcel 4

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm²)	Lead Detected Exteriorly (>1.0mg/cm²)	Lead in Soil Above Residential/ Industrial PRG
155	Administration Building	2001	Storage Room (10): Wainscot, Window Sash Office (100): Eaves, Window Jamb Copier Room (100): Window Sash, Sink/Cabinet Men's Restroom (100): Tile Walls, Floor, Window Jamb, Window Sash Hallway (101): Electrical Panel Cover Stairwell(101): Handrail, Door Frame Hallway (102): Walls, Wainscot, Window Jamb, Window Sash, Window Sill, Radiator Cover Office (102): Window Jamb, Window Sash Conf. Room (103): Wall Panel, Window Sash, Window Jambs Common Area (103): Wall Panel, Window Jambs, Window Sash, Steel Post Office (104): Window Jamb and Sash Office (109): Wall, Window Jamb and Sash Hallway (201): Fire Alarm Pull, Electrical Panel Cover Women's Restroom (201): Tile walls, Window Jambs Common Area (201): Window Jamb, Window Sash	Door Frame, Window Jamb, Window Sill, Window Sash, Fire Exit, Handrail, Stair Treat, Stair Riser, Fixed Window Panel, Door Landing	No/No

Table 7-3 Lead-based Paint and Lead in Soil Survey Results for Buildings in Parcel 4

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm ²)	Lead Detected Exteriorly (>1.0mg/cm ²)	Lead in Soil Above Residential/ Industrial PRG
156	Administration Building		Steel Entry Cage to Munitions Storage, Basement Stairwell, First Floor: Hallway Door Frame, Stairwell Wall, Door Frame Second Floor: Hallway – Riser, Doorframe, Men's Bathroom Tile Walls, Room 201 – Tile Walls, Wall.	Handrail, Stair Riser, Door Frame	No/No
533	Restrooms	NA	NA	NA	No/No
534	BBQ Shelter	2001	Not Applicable (outside structure)	Lead-Based Paint was not identified on any exterior building components	Not Sampled/Not Sampled
590	12 KV Substation Switchgear	2001	NA	NA	Not Sampled/Not Sampled
964	Basketball court	2001	Not Applicable (outside structure)	Yellow Safety Bumper	Not Sampled/Not Sampled
965	Volleyball court	2001	Not Applicable (outside structure)	Lead-Based Paint was not identified on any exterior building components.	Not Sampled/Not Sampled

Notes:

NA – Not applicable. No survey conducted for this building.

Sources: Benchmark 2001 (lead reports); Harding ESE 2001a:Table 5

7.2.6 Indoor Air Quality/Vapor Intrusion

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs beneath the Study Area. These VOCs can move from the ground to indoor and ambient air via the vapor intrusion pathway and can result in long-term human health effects. **Table 3-6** lists the buildings that have been sampled as part of the MEW Superfund Site cleanup activities following USEPA's 2010 Vapor Intrusion ROD Amendment. Of the four buildings that have been sampled for indoor air quality in Parcel 4, three showed concentrations of the seven chemicals of concern to be below USEPA's commercial indoor air cleanup levels from the 2010 Vapor Intrusion ROD Amendment. One building, Building 154 showed one ambient air quality measurement of TCE to be above the commercial indoor air cleanup level from the ROD Amendment.

7.2.7 Air Quality

An air emissions inventory of all sources of air pollutants throughout the ARC property was conducted in 2011. The inventory was split into three sources of air pollutants: combustion sources, evaporative loss sources, and miscellaneous sources (BAAQMD Undated). In the inventory, 279 air emissions sources throughout the ARC were identified (BAAQMD Undated). These sources included an external combustion source at Building 533—a water heater (BAAQMD Undated). No internal combustion sources or miscellaneous sources were identified in the Study Area (BAAQMD Undated). Three evaporative loss sources are facility-wide: solvent wipe cleaning, coating operations, and laser seeding. One Synthetic Minor Operating Permit condition (#8790) is related to facility-wide laser seeding, requiring a limit of 200 gallons during any consecutive 12-month period or 4 gallons during any one day.

8. Findings for Parcel 5

8.1 History and Current Use

The buildings in Parcel 5 were built from the early 1940s through the mid-1980s. None of the buildings in Parcel 5 are listed in the NRHP. Historic uses of the buildings in Parcel 5 included research, retail, utility, enlisted quarters, a recreation hall space, and storage-related facilities. Current uses of the buildings include office, retail, and utility-related facilities. Several buildings currently are mothballed and one is abandoned/condemned. **Table 8-1** summarizes key information for the buildings in Parcel 5, including historic use, size of the building, year constructed, and current use. **Figure 8-1** shows Parcel 5 and the buildings within it. **Appendix A** includes a photo of each of the buildings in Parcel 5. Two buildings in Parcel 5 have been demolished—Building 088 was demolished in 1994, and Building 113 was demolished in 2008.

Table 8-1 Summary of Historic and Current Use of Buildings in Parcel 5

Building	Historic Use	Area (gross square feet)	Year Constructed	National Register of Historic Places Eligibility Status	Current Use
104	12/2.4 KV Westside Substation	194	1943	No	Utilities
503	Navy Exchange Service Station	7,311	1966	No	Research Office ¹
526	EM Club Storage	689	1970	No	Mothballed ²
529	Storage Facility	2,565	1970	No	Mothballed
547E	Bachelor's Enlisted Quarters	19,900	1974	No	Mothballed
554	Partner Technology Facility	27,793	1975	No	Research Office
556	Administration Building	5,201	1984	No	Office
596	Lunar Science Research Facility	4,813	1985	No	Exchange
944	Recreation Center	12,950	1941	No	Recreation Hall Space/ Partially Condemned ³

Notes:

1. Research office means that although the building includes office space, the building also can be used for research but does not include a complete research lab.
2. Mothballed means use of the building has ceased, but does not preclude future use of the building.
3. Condemned means that the building space is unsafe for entry or use.

Sources: GIS data and Harding ESE 2001a



Figure 8-1 Map of Parcel 5

8.2 Environmental Setting

The following sections describe the identified environmental conditions for Parcel 5. These conditions are shown in **Figure 8-2**.

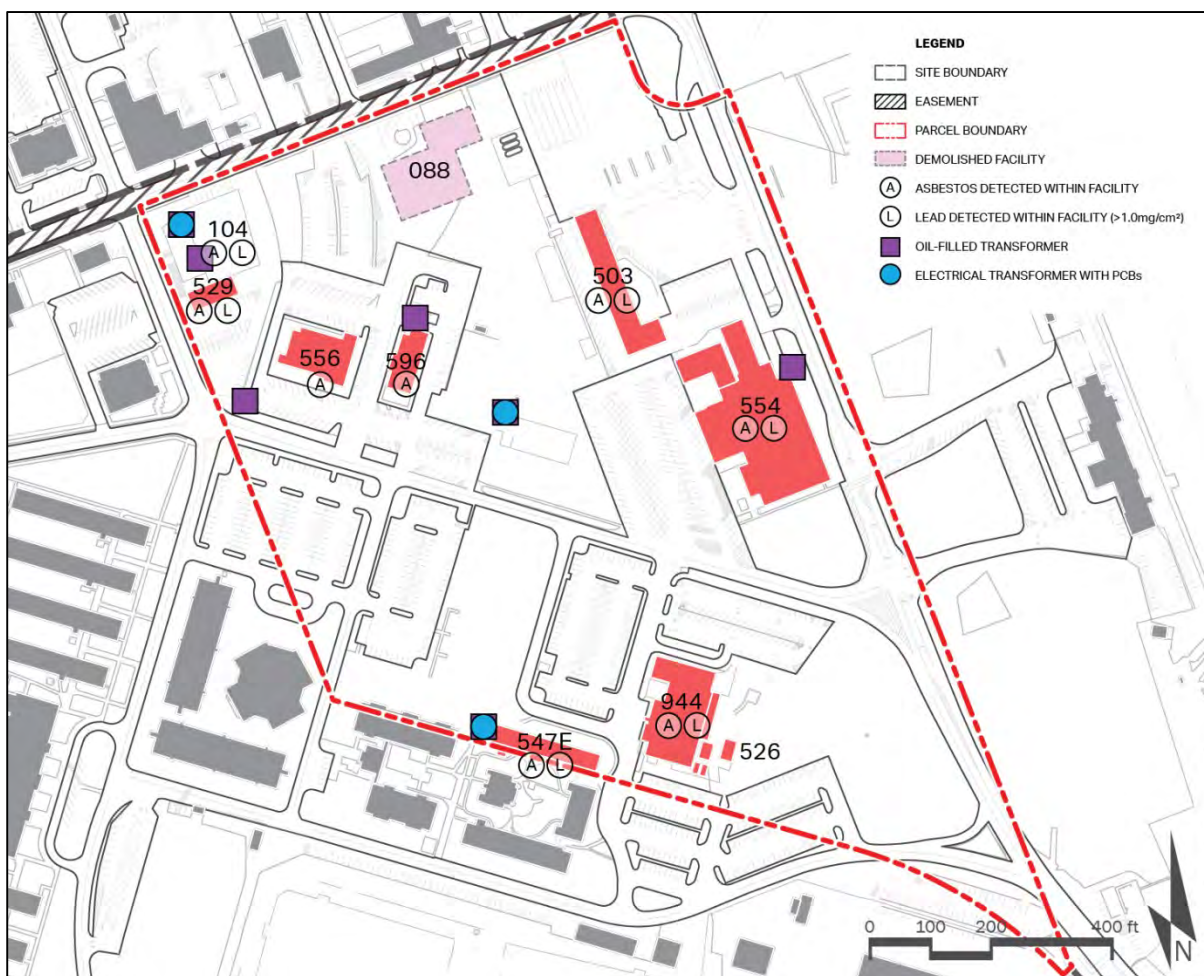


Figure 8-2 Parcel 5 Environmental Conditions

8.2.1 Hazardous Substances

Prior to 1994, hazardous materials and waste were at five buildings in Parcel 5 (Harding ESE 2001a). Descriptions of these substances by building are shown in **Table 8-2**. From 1994 to 2000, hazardous waste was at two buildings in Parcel 5—Building 529 contained oil contaminated water, and Building 944 contained an empty compressed gas cylinder, batteries, and mastic remover with asbestos (Harding ESE 2001a). Currently, no hazardous materials or waste are at any of the buildings in Parcel 5 (Chuck, pers. comm., 2018b), although oil-filled transformers are at several buildings in Parcel 5—Buildings 104, 554, 556, 596, and 944 (NASA 2018d).

Table 8-2 Former (Prior to 1994) Hazardous Materials and Waste Locations by Building in Parcel 5

Building	Hazardous Materials	Hazardous Waste
104 – Electric Substation	Solvents	None identified
503 – NASA Exchange (NEX) Service Station	Batteries, solvent, cuttings	Waste oil, use lube and gear oil, used transmission and brake fluids, dry cleaning solvent
529 – Office Storage (Vacant)	Laundry chemicals	Drummed hazardous waste, drummed former photo lab chemicals
556 – Credit Union	General cleaning supplies	None identified
596 – McDonald's	Cleaners, degreasers, grease	None Identified

Source: Harding ESE 2001a

8.2.2 CERCLA-Related and Petroleum Contamination

Three CERCLA-related sites are in Parcel 5: Sites 14-North, 15-North, and 18. Each site is described next.

Site 14-North: Site 14-North is part of a vacant parking lot in the northeastern portion of Parcel 5. A demolished former dry cleaning facility (Building 88) is associated with a fuel oil UST (Tank 67) and a solvent tank (Tank 68). Both tanks were removed in the early 1990s. Investigations did not identify contamination related to operation of the USTs. Leaked solvents and spent solvents (e.g., PCE) that historically were discharged to the sanitary sewer may be a contributor to the high concentration of dense non-aqueous phase liquids (i.e., immiscible liquid that does not dissolve in water) (BC&I Federal Services LLC 2014). However, groundwater contamination is present (Geosyntec Consultants 2018) and likely is related to the MEW Superfund Site (Harding ESE 2001a).

Site 15-North: Site 15-North is in Parcel 5. One tank (25) and one sump (42) were removed from the site in the 1990s (Harding ESE 2001a). Several facilities were removed from Building 503 in 2011, including three ASTs, one vapor burn-off unit, nine hydraulic operated vehicle lifts, one 500 gallon waste oil tank, three overhead vehicle lubrication oil fixtures, and one oil/water separator/clarifier sump (ISSi 2012). Soil analysis conducted in 2011 during removal of these facilities showed hydraulic oil contamination above site action levels present in subsurface soils located beneath three of the nine former hydraulic lifts, and beneath one hydraulic oil supply reservoir tank (ISSi 2012). Along the former clarifier drain pipeline and beneath the former clarifier sump there was hydraulic oil present, but at significantly reduced levels (ISSi 2012). A few soil samples also contained motor oil at very low concentrations (ISSi 2012). Gasoline was detected in one interior and one exterior sample, but below the site action level (ISSi 2012). Lead was present above the site soil action level at two locations along the clarifier drain pipeline and at the location of the clarifier (ISSi 2012).

Additional soil sampling was conducted in October 2012 and found no constituents above cleanup standards except one sample that detected benza(a)pyrene at a concentration of 0.38 mg/kg, compared to the standard of 0.21 mg/kg. This analysis also showed that petroleum hydrocarbons detected in soils in 2010 are very limited in lateral and vertical extent. Lead in the soil was also not corroborated in 2012. Groundwater analysis found total petroleum hydrocarbons as hydraulic oil (TPH-HO) above the Groundwater Screening Level of 100 µg/L in 8 of 12 locations. Total petroleum hydrocarbons as motor oil (TPH-MO) was not found above the reporting limit (40 µg/L) in any of the samples. VOC analytes were also detected above Groundwater Screening Levels at 11 of 12

locations. These analytes and concentrations appeared to be part of the Regional Plume as they were consistent with other local A1-zone groundwater monitoring wells (CE2-Kleinfelder Joint Venture 2015).

Groundwater sampling conducted in February 2014 and March 2015 at/around Building 503 supports the conclusion that a release from Building 503 hydraulic lifts, waste oil line, or clarifier has not migrated downgradient of Building 503 and is relatively localized. The limited amount of remaining contamination is isolated and does not present an exposure pathway to occupants of the building at this time because the site is paved with concrete (inside the building) and asphalt (outside the building), which limits access to the soil and restricts percolation into the soil/groundwater. Groundwater concentrations of TPH-HO and TPH-MO are within the same order of magnitude as the Groundwater Screening Level, are relatively stable, and appear limited to the immediate vicinity of the (now removed) hydraulic lifts (CE2-Kleinfelder Joint Venture 2015). VOCs were detected in the Site 15 area as of 2016 (Geosyntec Consultants 2018), likely related to the MEW Superfund Site.

Site 18: Site 18 is in a vacant parking lot in the northwestern portion of Parcel 5, near Site 14-North. Site 18 is associated with former sump tank 66. The sump tank was used to collect drainage from floor drains associated with the former dry cleaning building (Building 88). Following removal of the tank, soil remediation addressed potential contamination (Harding ESE 2001a). Groundwater data collected by Geosyntec Consultants in 2016 showed the area around the former tank to contain levels of TCE above cleanup goals (Geosyntec Consultants 2018). Site 18 contamination likely contributed to the Regional Plume north of Highway 101. (Harding ESE 2001a).

8.2.3 Groundwater

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs, which are recorded during monitoring (up to semi-annually) of wells throughout the plume area. **Table 3-4** lists VOC concentration levels from the 2017 Annual Progress Report. In Parcel 5, 27 of 29 wells tested in 2016 showed analytes above the reported detection limits.

8.2.4 Storage Tanks

A total of 8 USTs in Parcel 5 at Building 503 were removed between 1990 and 1992 (Harding ESE 2001a). Dissolved phase gasoline and BTEX were identified in the soil near the former UST areas; however, no further action was anticipated (Tetra Tech 1998). The USTs removed at Building 503 were replaced with three ASTs in 1999, each 10,000 gallons in size (ISSi 2012). These three ASTs at Building 503 were removed in 2011, along with all associated non-electrical piping and equipment and one 500 gallon waste oil tank (ISSi 2012).

8.2.5 Oil Water Separators

A 1,700-gallon oil water separator and a sump were at Building 503, but these were removed in 1993 and 1990, respectively (Harding ESE 2001a). A 100 gallon capacity oil/water separator/clarifier sump located on the west side of Building 503 was removed in March 2011 (ISSi 2012). Contamination related to the sump is discussed in Section 8.2.2, CERCLA-Related and Petroleum Contamination, for Site 15-North.

8.2.6 Asbestos

Asbestos is categorized in one of two ways: friable or non-friable material. Friable ACM can be pulverized by hand. Non-friable ACM must undergo destructive forces before fiber release can occur. For most of the buildings in Parcel 5, an AHERA-style asbestos survey was conducted in 2001 to determine the locations of accessible and, to the extent feasible, inaccessible friable and non-friable ACM. The inspections varied by building as to whether interior and/or exterior materials were

reviewed. **Table 8-3** summarizes the buildings in Parcel 5, when they were sampled for asbestos, what materials were found to contain friable or non-friable asbestos, and what materials were assumed to contain asbestos.

Table 8-3 Asbestos Survey Results for Buildings in Parcel 5

Building Number	Building Name	Year Surveyed	Asbestos Detected in These Friable (or Jacketed Friable) Materials	Asbestos Detected in These Non-Friable Materials	Materials Assumed to Contain Asbestos
104	12/2.4 KV Westside Substation	2001	None	Roofing material	Not applicable
503	Partners Manufacturing and Prototype Facility	2001	None	Floor-mastic, floor tile, wall-board	Fire door
529	Storage facility	2001	None	Ceiling- acoustical plaster- soft	Not applicable
547E	BEQ	2001	None	Mastic, roofing material, wallboard	Not applicable
554	Partner Technology Facility	2001	None	Wall board, textured wall board, baseboard adhesive, floor-mastic	None
556	Industry Partners Building	2001	None	Floor tile, roofing material	Not applicable
596	Lunar Science Research Facility	2001	None	Roofing material	Not applicable
944	Recreation Center	2001	None	Baseboard adhesive, floor tile, mastic, stucco, wall, ceiling- acoustical plaster-soft	Not applicable

Notes:

Building 526 has not been surveyed for asbestos-containing materials.

Not Applicable – no mention of these materials was contained in the survey report.

Sources: Benchmark 2001 (asbestos reports)

8.2.7 Polychlorinated Biphenyls

Several facilities above the DHS-regulated concentration of 5 ppm PCBs are in Parcel 5. A transformer at Building 104 was tested in 1995 and 1996, and was found to contain 33 and 34 ppm PCBs in 1995 and 1996, respectively (Harding ESE 2001a). Currently, two transformers are at Building 104 (T-23 and 24), one of which is known to contain PCBs (NASA 2018d). Three different oil fuse capacitors were tested in 1993 at Building 503 and were found to contain 17 to 27 ppm PCBs (Harding ESE 2001a). This equipment does not appear to be at Building 503 (NASA 2018d). Transformers with PCBs also are at Building 547E and east of Building 596 (NASA 2018d). Oil-filled transformers are at Buildings 554, 596, and 556; however, they do not contain PCBs (NASA 2018d).

8.2.8 Lead-based Paints and Lead in Soils

Surveys were conducted in 2001, to determine the presence of LBP at all of the buildings in Parcel 5. Visual inspections, sampling, and analysis were conducted on inside and outside components of buildings throughout the parcel. Paint chip samples and assays were taken using an X-ray fluorescence measurement instrument.

Levels of lead above 1.0mg/cm² in residual LBPs are considered to be above USEPA actionable levels and would require regulatory compliance with CAL OSHA and CDPH standards before renovation or demolition (CDPH 2014; USEPA 2018). **Table 8-4** summarizes where lead was detected above USEPA and DHS levels, on or within buildings in Parcel 5.

Surface soil samples were collected from the perimeter of several buildings in the Study Area in 1993. **Table 8-4** shows the results of any sampling done around buildings in Parcel 5 and notes whether any samples were found to have lead detected above USEPA Region 9 residential PRGs or industrial PRGs. None of the buildings surveyed in Parcel 5 were found to exceed USEPA PRGs.

8.2.9 Indoor Air Quality/Vapor Intrusion

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs beneath the Study Area. These VOCs can move from the ground to indoor and ambient air via the vapor intrusion pathway and can result in long-term human health effects. **Table 3-6** lists the buildings that have been sampled as part of the MEW Superfund Site cleanup activities following USEPA's 2010 Vapor Intrusion ROD Amendment. The five buildings that have been sampled for indoor air quality in Parcel 5 show concentrations of the seven chemicals of concern to be below USEPA's commercial indoor air cleanup levels from the 2010 Vapor Intrusion ROD Amendment.

Table 8-4 Lead-based Paint and Lead in Soil Survey Results for Buildings in Parcel 5

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm ²)	Lead Detected Exteriorly (>1.0mg/cm ²)	Lead in Soil Above Residential/ Industrial PRG
104	12/2.4 KV Westside Substation	2001	Door Frame	Walls	Not Sampled/Not Sampled
503	Partners Manufacturing & Prototype Facility	2001	Restroom Tile Walls, Truss Steel, Metal Building Overhand	Metal Building Overhang, Air H2o Station, Green Metal Overhang	Not Sampled/Not Sampled
526	EM Club Storage	NA	NA	NA	No/No
529	Storage Facility	2001	Lead-Based Paint was not identified on any interior building components	Left Rear Service Door	Not Sampled/Not Sampled
547E	BEQ	2001	Bathroom Tile Walls	Lead-Based Paint was not identified on any exterior building components	No/No
554	Partner Technology Facility	2001	Men's Bathroom Tile Wall	Lead-Based Paint was not identified on any exterior building components	No/No
556	Industry Partners Building	2001	Lead-Based Paint was not identified on any building components	Lead-Based Paint was not identified on any building components	No/No

Table 8-4 Lead-based Paint and Lead in Soil Survey Results for Buildings in Parcel 5

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm²)	Lead Detected Exteriorly (>1.0mg/cm²)	Lead in Soil Above Residential/Industrial PRG
596	Lunar Science Research Facility	2001	Lead-Based Paint was not identified on any building components	Lead-Based Paint was not identified on any building components	No/No
944	Recreation Center	2001	Parcheezi's Roof Support, Manager's Office Window Mullion and Jamb.	Building Trim, Flashing, Window Frames and Sills, Door Molding, Fascia, Safety Yellow Paint, Base Sealant	Not Sampled/Not Sampled

Notes:

Building 526 was not surveyed for lead-based paint because of the absence of suspected LBP.

Sources: Benchmark 2001 (lead reports); Harding ESE 2001a:Table 5

8.2.10 Air Quality

An air emissions inventory of all sources of air pollutants throughout the ARC property was conducted in 2011. The inventory was split into three sources of air pollutants: combustion sources, evaporative loss sources, and miscellaneous sources (BAAQMD Undated). In the inventory, 279 air emissions sources throughout the ARC were identified (BAAQMD Undated). These sources included external combustion sources at Buildings 554 and 596—Building 554 contained six space heaters, and Building 596 contained a water heater (BAAQMD Undated). No internal combustion sources or miscellaneous sources were identified in the Study Area (BAAQMD Undated). Three evaporative loss sources are facility-wide: solvent wipe cleaning, coating operations, and laser seeding. One Synthetic Minor Operating Permit condition (#8790) is related to facility-wide laser seeding, requiring a limit of 200 gallons during any consecutive 12-month period or 4 gallons during any one day.

9. Findings for Parcel 6

9.1 History and Current Use

Building 543 was constructed in the early 1970s. The building is not listed in the NRHP. The building historically was used as a research laboratory and currently is used as an office. **Table 9-1** summarizes key information on Building 543, including historic use, size of the building, year constructed, and current use. **Figure 9-1** shows Parcel 6 and the buildings within it. **Appendix A** includes a photo of Building 543 in Parcel 6.

Table 9-1 Summary of Historic and Current Use of Building 543 in Parcel 6

Building	Historic Use	Area (gross square feet)	Year Constructed	National Register of Historic Places Eligibility Status	Current Use
543	Research Laboratory Building	9,031	1973	No	Fuel Cell Research and Testing Space

Sources: GIS data and Harding ESE 2001a

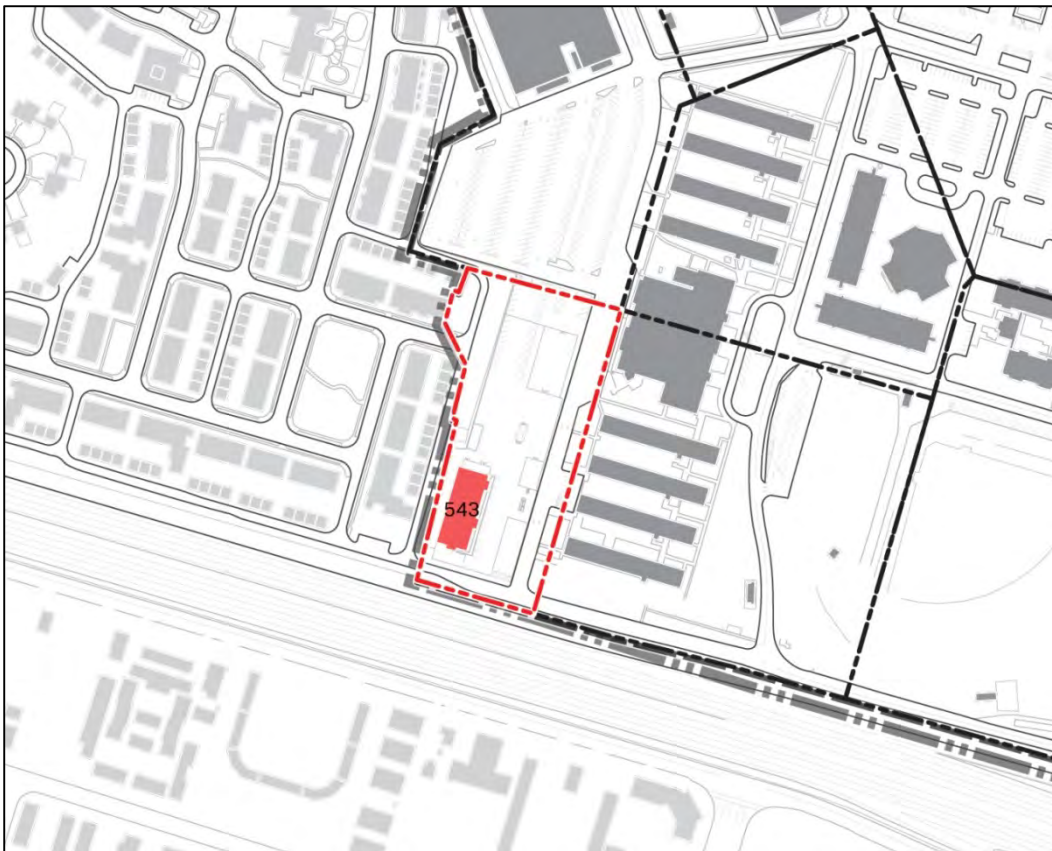


Figure 9-1 Map of Parcel 6

9.2 Environmental Setting

The following sections describe the identified environmental conditions for Parcel 6. These conditions are shown in **Figure 9-2**.

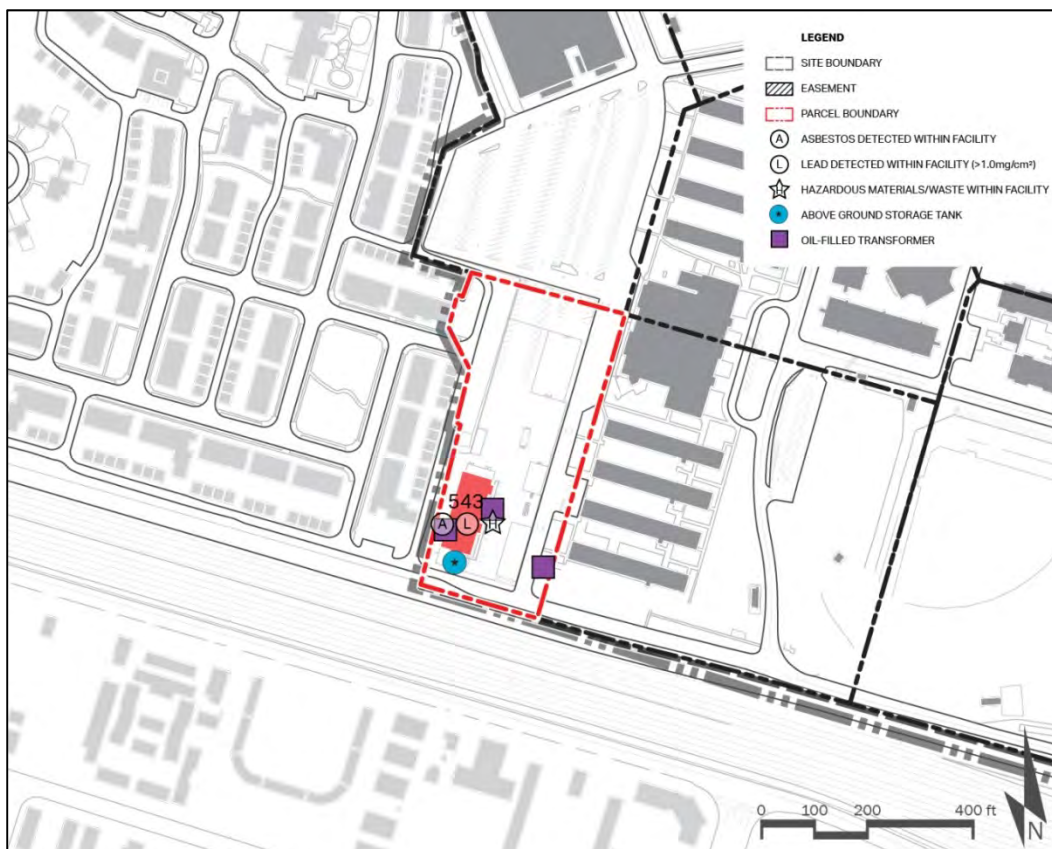


Figure 9-2 Parcel 6 Environmental Conditions

9.2.1 Hazardous Substances

Prior to 1994, hazardous materials consisting of Nova clean, adhesives, spray sealer, Proclean, and paint were in Building 543 (Harding ESE 2001a). From 1994 to 2000, hazardous materials (solvents) and waste (e.g., engine oil, miscellaneous oils, and sump sludge) were in Building 543 (Harding ESE 2001a). Currently, five oil-filled transformers and a 1,600-gallon diesel backup generator are at Building 543 in Parcel 6 (NASA 2018e).

9.2.2 Groundwater

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs, which are recorded during monitoring (up to semi-annually) of wells throughout the plume area. **Table 3-4** lists VOC concentration levels from the 2017 Annual Progress Report. In Parcel 6, two of the three wells tested in 2016 showed analytes above the reported detection limits.

9.2.3 Storage Tanks

As stated above, one 1,600-gallon aboveground storage tank is at Building 543 in Parcel 6, which is a diesel backup generator (NASA 2018e).

9.2.4 Asbestos

Asbestos is categorized in one of two ways: friable or non-friable material. Friable ACM can be pulverized by hand. Non-friable ACM must undergo destructive forces before fiber release can occur. For the building in Parcel 6, an AHERA-style asbestos survey was conducted in 2001, to determine the locations of accessible and, to the extent feasible, inaccessible friable and non-friable ACM. The inspection was limited to interior materials only. **Table 9-2** summarizes when Building 543 in Parcel 6 was sampled for asbestos, what materials were found to contain friable or non-friable asbestos, and what materials were assumed to contain asbestos.

Table 9-2 Asbestos Survey Results for Building 543 in Parcel 6

Building Number	Building Name	Year Surveyed	Asbestos Detected in These Friable (or Jacketed Friable) Materials	Asbestos Detected in These Non-Friable Materials	Materials Assumed to Contain Asbestos
543	Research Laboratory Building	2001	None	Floor tile, vinyl tile	Not applicable

Notes:

Not Applicable – no mention of these materials was contained in the survey report.

Sources: Benchmark 2001 (asbestos reports)

9.2.5 Lead-based Paints and Lead in Soils

Surveys were conducted in 2001, to determine the presence of LBPs at Building 543 in Parcel 6. Visual inspections, sampling, and analysis were conducted on inside and outside components of the building. Paint chip samples and assays were taken using an X-ray fluorescence measurement instrument. Levels of lead above 1.0mg/cm² in residual LBPs are considered to be above USEPA actionable levels and would require regulatory compliance with CAL OSHA and CDPH standards before renovation or demolition (USEPA 2018; CDPH 2014). **Table 9-3** summarizes where lead was detected above USEPA and DHS levels, on or within Building 543 in Parcel 6.

Surface soil samples were collected from the perimeter of several buildings in the Study Area in 1993. **Table 9-3** presents the results of sampling done around the building in Parcel 6 and notes whether any samples were found to have lead detected above USEPA Region 9 residential PRGs or industrial PRGs. Building 543 in Parcel 6 was not found to exceed USEPA PRGs.

Table 9-3 Lead-based Paint and Lead in Soil Survey Results for Building 543 in Parcel 6

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm ²)	Lead Detected Exteriorly (>1.0mg/cm ²)	Lead in Soil Above Residential/ Industrial PRG
543	Research Laboratory Building	2001	Lead-Based Paint was not identified on any interior building components.	Yellow Safety Paint	No/No

Sources: Benchmark 2001 (lead reports); Harding ESE 2001a:Table 5

9.2.6 Indoor Air Quality/Vapor Intrusion

Chemical pollution from former land uses has resulted in a plume of groundwater contaminated with VOCs beneath the Study Area. These VOCs can move from the ground to indoor and ambient air via the vapor intrusion pathway and can result in long-term human health effects. **Table 3-6** lists the buildings that have been sampled as part of the MEW Superfund Site cleanup activities following USEPA's 2010 Vapor Intrusion ROD Amendment. Building 543 has been sampled for indoor air quality and showed concentrations of the seven chemicals of concern to be below USEPA's commercial indoor air cleanup levels from the 2010 Vapor Intrusion ROD Amendment.

10. Findings for Parcel 6a

10.1 History and Current Use

Building 476 was constructed in the mid-1950s. The building is not listed in the NRHP. The building historically was used as a Navy exchange/mixed use facility and currently is used as an office.

Table 10-1 summarizes key information on Building 476 in Parcel 6a, including historic use, size of the building, year constructed, and current use. **Figure 10-1** shows Parcel 6a and the buildings within it.

Appendix A includes a photo of Building 476 in Parcel 6a.

Table 10-1 Summary of Historic and Current Use of Building 476 in Parcel 6a

Building	Historic Use	Area (gross square feet)	Year Constructed	National Register of Historic Places Eligibility Status	Current Use
476	Navy Exchange/Mixed Use Facility	43,374	1954	No	Condemned

Sources: GIS data and Harding ESE 2001a

10.2 Environmental Setting

The following sections describe the identified environmental conditions for Parcel 6a. These conditions are shown in **Figure 10-2**.

10.2.1 Hazardous Substances

No hazardous materials or waste have been or currently are at Building 476 in Parcel 6a (Chuck, pers. comm., 2018b; Harding ESE 2001a). However, two oil-filled transformers are at Building 476 (T-7 and 8) (NASA 2018d).

10.2.2 Asbestos

Asbestos is categorized in one of two ways: friable or non-friable material. Friable ACM can be pulverized by hand. Non-friable ACM must undergo destructive forces before fiber release can occur. For the building in Parcel 6a, an AHERA-style asbestos survey was conducted in 2001, to determine the locations of accessible and, to the extent feasible, inaccessible friable and non-friable ACM. The inspection reviewed both interior and exterior materials. **Table 10-2** summarizes when Building 476 in Parcel 6a was sampled for asbestos, what materials were found to contain friable or non-friable asbestos, and what materials were assumed to contain asbestos.

10.2.3 Polychlorinated Biphenyls

Two oil-filled electrical transformers are in Parcel 6a; however, neither transformer is known to contain PCBs (NASA 2018d).

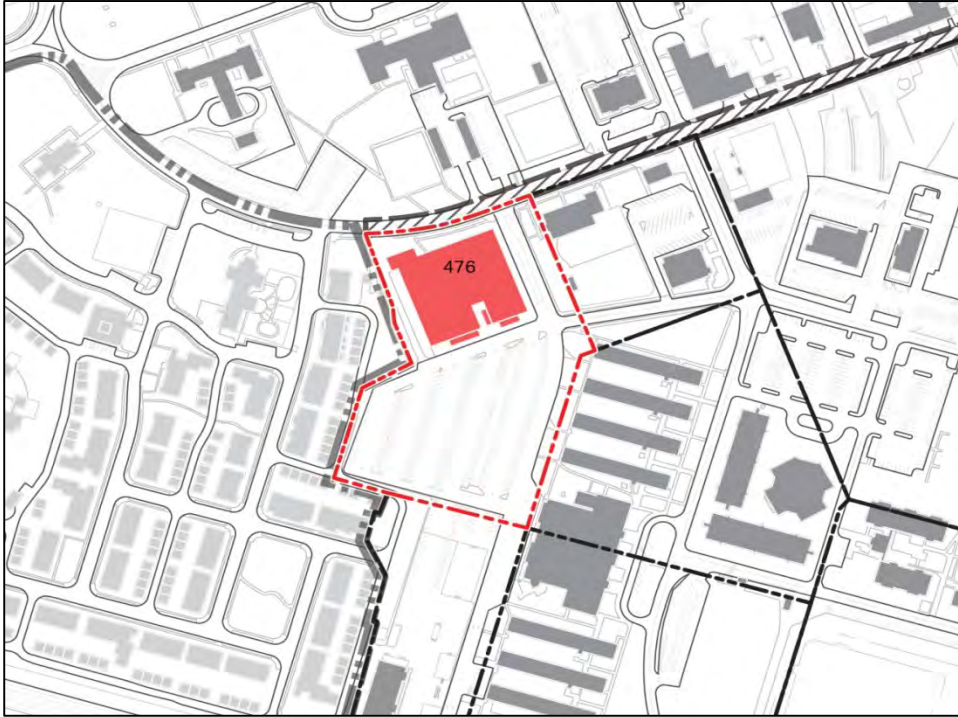


Figure 10-1 Map of Parcel 6a

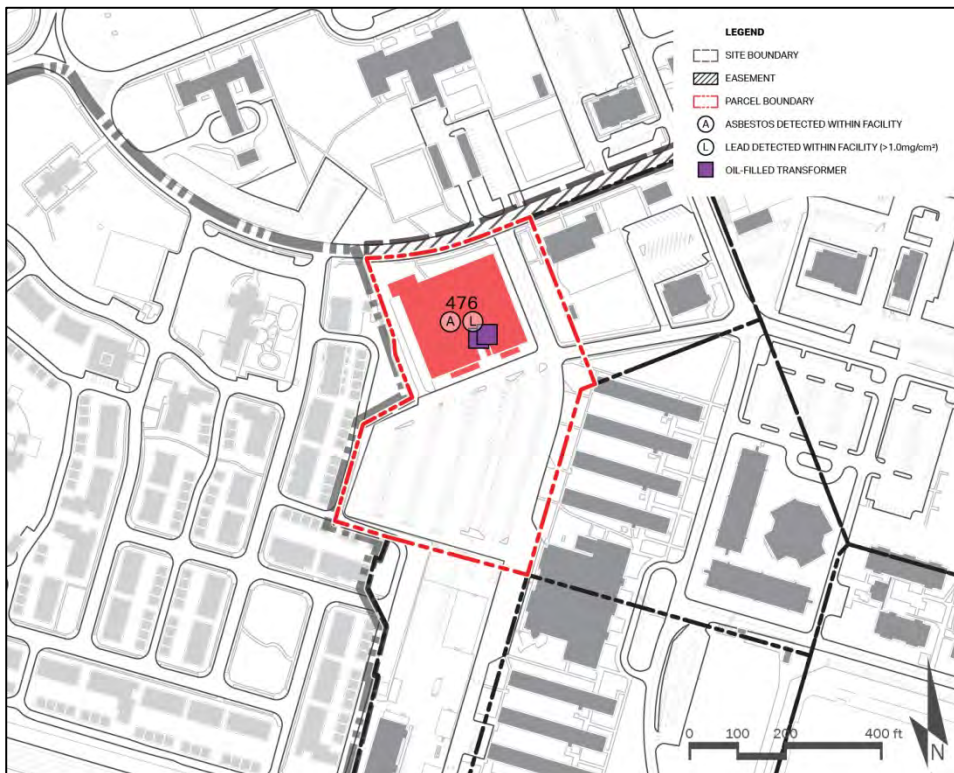


Figure 10-2 Parcel 6a Environmental Conditions

Table 10-2 Asbestos Survey Results for Building 476 in Parcel 6a

Building Number	Building Name	Year Surveyed	Asbestos Detected in These Friable (or Jacketed Friable) Materials	Asbestos Detected in These Non-Friable Materials	Materials Assumed to Contain Asbestos
476	Mixed Use Facility	2001	Pipe elbows, pipe insulation, tank insulation	Floor tile, mastic, roofing composite, wall-board	Fire door, transite panel

Sources: Benchmark 2001 (asbestos reports)

10.2.4 Lead-based Paints and Lead in Soils

Surveys were conducted in 2001, to determine the presence of LBPs at Building 476 in Parcel 6a. Visual inspections, sampling, and analysis were conducted on inside and outside components of the building throughout. Paint chip samples and assays were taken using an X-ray fluorescence measurement instrument.

Levels of lead above $1.0\text{mg}/\text{cm}^2$ in LBPs are considered to be above USEPA actionable levels and would require regulatory compliance with CAL OSHA and CDPH standards before renovation or demolition (USEPA 2018; CDPH 2014). **Table 10-3** summarizes where lead was detected above USEPA and DHS levels, on or within Building 476 in Parcel 6a.

Surface soil samples were collected from the perimeter of several buildings in the Study Area in 1993. **Table 10-3** presents the results of sampling done around the building in Parcel 6a and notes whether any samples were found to have lead detected above USEPA Region 9 residential PRGs or industrial PRGs. Building 476 in Parcel 6a was not found to exceed USEPA PRGs.

Table 10-3 Lead-based Paint and Lead in Soil Survey Results for Building 476 in Parcel 6a

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly ($>1.0\text{mg}/\text{cm}^2$)	Lead Detected Exteriorly ($>1.0\text{mg}/\text{cm}^2$)	Lead in Soil Above Residential/Industrial PRG
476		2001	Bathroom Wall Tile, Baseboard, Main Warehouse Swing Door	Fire Door	No/No

Sources: Benchmark 2001 (lead reports); Harding ESE 2001a:Table 5

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11. Findings for Parcel 10

11.1 History and Current Use

According to available information, Building 431 was constructed in 1953, but when Building 582 was constructed is unknown. Neither structure is listed in the NRHP. Building 582 historically was used as a gate marquee and currently is used as sign. Building 431 was and still is being used as a fuel storage tank. **Table 11-1** summarizes available key information on Buildings 431 and 582, including historic use, size of the building, year constructed, and current use. **Figure 11-1** shows Parcel 10 and the buildings within it. **Appendix A** includes a photo of Buildings 431 and 582 in Parcel 10.

Table 11-1 Summary of Historic and Current Use of Buildings 431 and 582 in Parcel 10

Building	Historic Use	Area (gross square feet)	Year Constructed	National Register of Historic Places Eligibility Status	Current Use
431	Bulk Loading/Unloading Diesel Storage Tank	-	1953	No	Underground Storage Tank
582	Ellis Gate Marquee	123	Unknown	No	Sign

Sources: GIS data and Harding ESE 2001a

11.2 Environmental Setting

The following sections describe the identified environmental conditions for Parcel 10. These conditions are shown in **Figure 11-2**.

11.2.1 Hazardous Substances

No hazardous materials or waste have been or currently are at buildings in Parcel 10 (Harding ESE 2001a; Chuck 2018b).

11.2.2 Storage Tanks

One UST is at Building 431 in Parcel 10 (see **Table 11-2**). Building 431 contains an active 12,000-gallon gas UST (Harding ESE 2001a), which along with the UST at Building 431 supply fuel to the Public Works Fuel Station at Building 161 (Chuck, pers. comm., 2018b). The tank was upgraded in 1998 to double-walled pipes (Harding ESE 2001a). NASA will remove the UST at Building 431 when the fuel station closes (Chuck, pers. comm., 2018b).

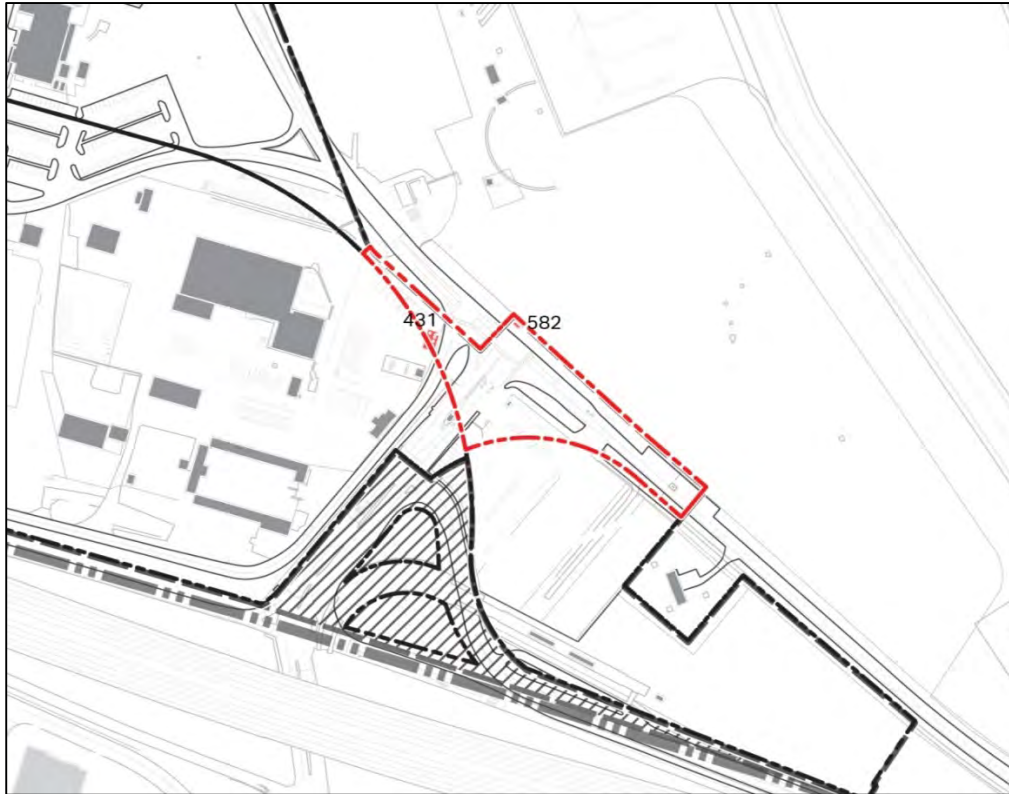
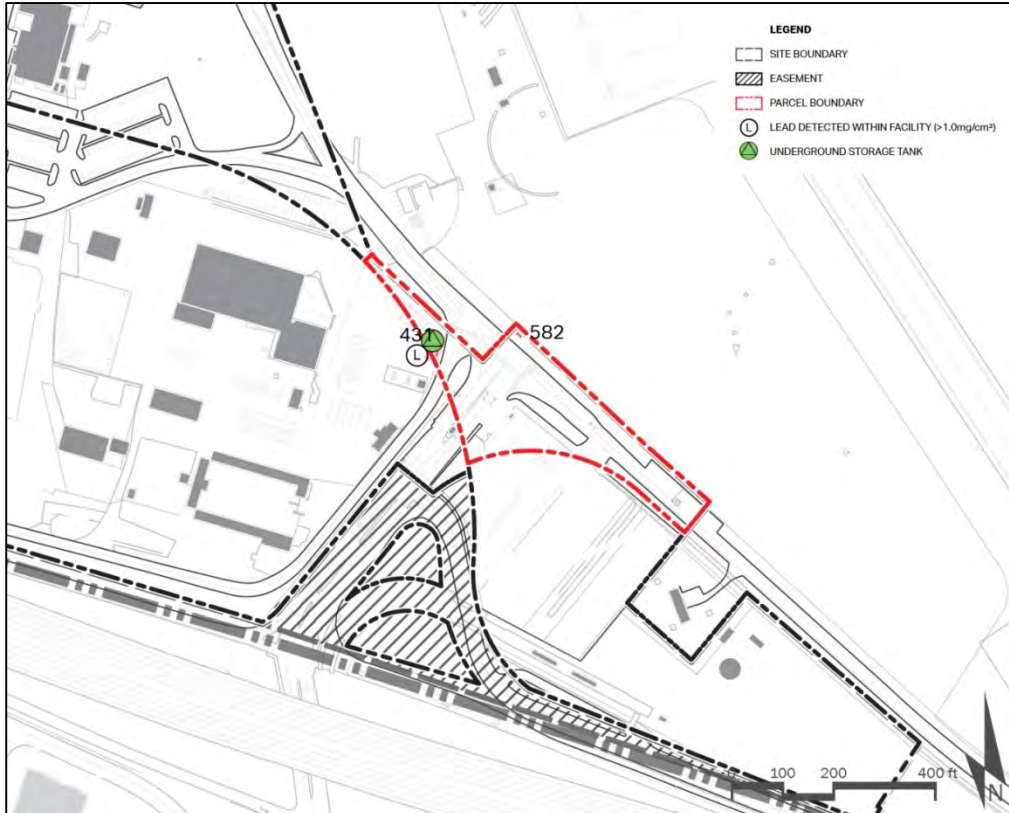
**Figure 11-1 Map of Parcel 10****Figure 11-2 Parcel 10 Environmental Conditions**

Table 11-2 Underground Storage Tank at Building 431 in Parcel 10

Building	Tank/Sump No.	Contents	Size (Gallons)	Year Installed	Date Removed	Notes
431	70	Gas	12,000	1986	Active	Also referred to as Tank 431. This tank was upgraded in 1998. Tanks 431 and 432 supply fuel (unleaded gasoline and diesel) to Ellis Street Public Works Service Station.

Notes:

Tank Number is from Tetra Tech 1994 and PRC 1994.

Source: Harding ESE 2001a:Table 3

11.2.3 Asbestos

Asbestos is categorized in one of two ways: friable or non-friable material. Friable ACM can be pulverized by hand. Non-friable ACM must undergo destructive forces before fiber release can occur. It appears that Buildings 431 and 582 in Parcel 10 were reviewed for ACM, possibly in 2001, but no formal report was issued. No suspected or assumed ACM were identified in Building 582 or 431 (Benchmark 2001t, cs).

11.2.4 Lead-based Paints and Lead in Soils

Surveys were conducted in 2001, to determine the presence of LBPs at Buildings 431 and 582. Visual inspections, sampling, and analysis were conducted on inside and outside components of the buildings. Paint chip samples and assays were taken using an X-ray fluorescence measurement instrument. Levels of lead above 1.0mg/cm² in residual LBPs are considered to be above USEPA actionable levels and would require regulatory compliance with CAL OSHA and CDPH standards before renovation or demolition (USEPA 2018; CDPH 2014). **Table 11-3** summarizes where lead was detected above USEPA and DHS levels, on or within Buildings 431 and 582 in Parcel 10. Surface soil samples were collected from the perimeter of several buildings in the Study Area in 1993, to determine whether any samples were found to have lead detected above USEPA Region 9 residential PRGs or industrial PRGs. Buildings 431 and 582 in Parcel 10 were not sampled as part of this effort.

Table 11-3 Lead-based Paint and Lead in Soil Survey Results for Buildings 431 and 582 in Parcel 10

Building Number	Building Name	Year Surveyed	Lead Detected Interiorly (>1.0mg/cm ²)	Lead Detected Exteriorly (>1.0mg/cm ²)	Lead in Soil Above Residential/ Industrial PRG
431*	Bulk Loading/Diesel Storage Tank	2001	Not Applicable (outdoor structures)	Parking Ballard's, Safety Wall Yellow, Fuel Station Foundation, Fuel Pump, Driver Safety Stripping	Not Sampled/Not Sampled
582	South Gate Information Sign	2001	Lead-Based Paint was not identified on any building components.	Lead-Based Paint was not identified on any building components.	Not Sampled/Not Sampled

Notes:

* Buildings 431 and 432 were tested together.

Sources: Benchmark 2001 (lead reports); Harding ESE 2001b:Table 5

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12. Findings for Parcel 11

12.1 History and Current Use

The one structure in Parcel 11, a water tower, was built in 2011 and is not listed in the NRHP.

Table 12-1 summarizes available key information on MF 1025A, including historic use, size, year constructed, and current use. **Figure 12-1** shows Parcel 11 and the building within it. **Appendix A** includes a photo of Building MF 1025A in Parcel 11.

Table 12-1 Summary of Historic and Current Use of MF 1025A in Parcel 11

Building	Historic Use	Area (gross square feet)	Year Constructed	National Register of Historic Places Eligibility Status	Current Use
MF 1025A	Water Tank	400,000 gallons	2011	No	Water Tank

Source: GIS data

12.2 Environmental Setting

The following sections describe the identified environmental conditions for Parcel 11. These conditions are shown in **Figure 12-2**.

12.2.1 Hazardous Substances

No historical information exists about any hazardous materials or waste at the building in Parcel 11. No hazardous materials or waste currently are at the building in Parcel 11 (Harding ESE 2001a; Chuck, pers. comm., 2018b).

12.2.2 Storage Tanks

Two shop-fabricated ASTs are in Parcel 11, just north of Building MF1025A (NASA 2018c). Tank TK-WT-1 is an emergency generator with a 520 gallon diesel fuel tank. Tanks TK-WT-2 is an 84 gallon diesel fuel tank located inside the fire suppression building just north of the water tower.

12.2.3 Asbestos

Asbestos is categorized in one of two ways: friable or non-friable material. Friable ACM can be pulverized by hand. Non-friable ACM must undergo destructive forces before fiber release can occur. Building MF1025A in Parcel 11 has not been surveyed for asbestos.

12.2.4 Lead-based Paints and Lead in Soils

Surveys were conducted in 2001, to determine the presence of LBPs in many buildings in the Study Area; however, Building MF 1025A (Water Tower) was not tested.

Surface soil samples were collected from the perimeter of several buildings in the Study Area in 1993; however, it does not appear that Building MF 1025A was included in this survey, and thus no information exists regarding lead levels in soils around Building MF 1025A.

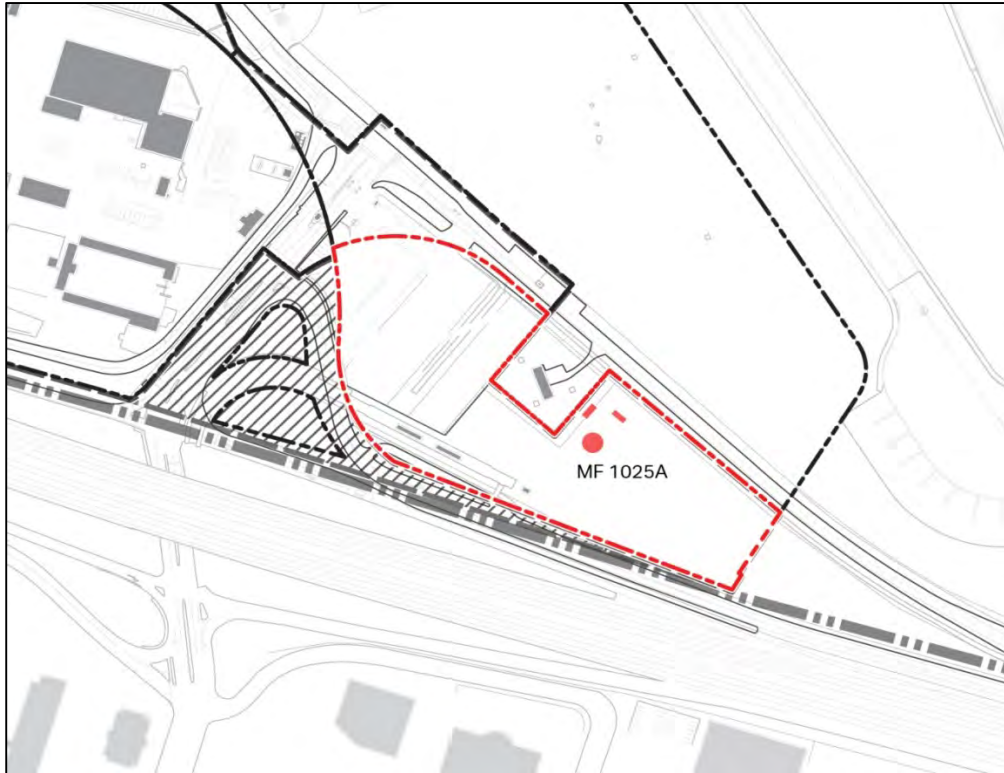


Figure 12-1 Map of Parcel 11

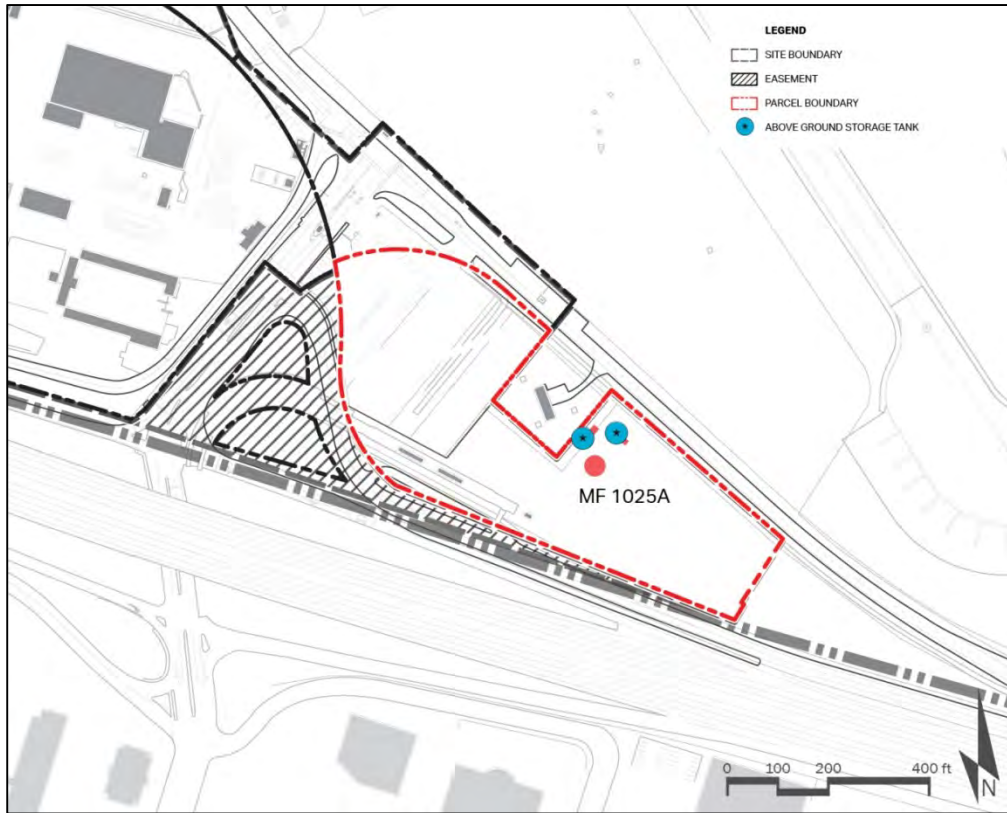


Figure 12-2 Parcel 11 Environmental Conditions

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13. Findings for Adjacent Properties

NASA Ames property is north and east of the Study Area, Army property is to the west, and private property is to the south. As shown in **Figure 1-1**, the Shenandoah Plaza area, which contains many historic buildings, is north of the Study Area. East of the Study Area is the Eastside/Airfield, which includes active runways and other airfield facilities. LBP and ACM have been identified or are suspected to be present in the majority of buildings in the areas north and east of the Study Area, and LBP has been identified in the soil associated with many of the buildings. USTs and ASTs have been removed from both areas, and both areas contain CERCLA-related sites.

The Army's Wescoat Housing area is west of the Study Area. Data is not available regarding the environmental baseline for this area.

The private property south of the Study Area contains the MEW Superfund Site. Properties on all sides of the Study Area contain contaminated groundwater, similar to the Study Area. Ongoing monitoring and remediation of groundwater occurs on all properties adjacent to the Study Area.

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14. Applicable Regulatory Compliance Issues

The potential environmental constraints and regulatory compliance issues for all nine parcels in the Study Area are shown in **Table 14-1**. Residual pesticides likely are present on all parcels, and all parcels contain contaminated groundwater from the Regional Plume, which also means vapor intrusion is an issue on all parcels. Almost all parcels contain ACM and LBP in at least some of their buildings. About half of the parcels currently contain air emissions sources. Only a few parcels contain CERCLA-related sites, active storage tanks, or PCB-containing facilities (other than lighting ballasts). Only one parcel (Parcel 2) contains an active oil water separator, and only two parcels currently have buildings that contain hazardous materials and waste.

Table 14-1 Summary of Issues by Parcel

Issue	Presence of Issue by Parcel								
	1	2	3	4	5	6	6a	10	11
Residual Pesticide	X	X	X	X	X	X	X	X	X
Hazardous Substances ¹		X	X	X		X			
CERCLA-Related Sites		X		X	X				
Groundwater Contamination	X	X	X	X	X	X	X	X	X
Active Storage Tank		X	X					X	X
Active Oil Water Separator		X							
Asbestos-Containing Materials ²	X	X	X	X	X	X	X		UNK
PCB-Containing Facilities ³		X			X				
Lead-Based Paint and/or Lead in Soils	X	X	X	X	X	X	X	X	UNK
Indoor Air Quality/Vapor Intrusion ⁴	X	X	X	X	X	X	X	X	X
Air Quality ⁵	X	X	X	X	X				

Notes:

1. This indicates only the current use of buildings for storing hazardous materials or waste.
 2. This indicates either friable or non-friable asbestos-containing materials in at least one building in the parcel.
 3. It is assumed that all buildings contain PCB light ballasts. The table shows parcels with other PCB-containing facilities (other than light ballasts).
 4. This indicates where vapor intrusion from contaminated groundwater may be an issue.
 5. This indicates where inventoried air emission sources are located.
- UNK – The building in this parcel has not been tested for these issues.

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15. Conclusions

The Study Area has been divided into Parcels 1 through 6, 6a, 10, and 11 for current and future leasing activities. The objective of the EBS is to classify real property in the Study Area into ECP parcel categories, to provide a baseline condition for future lessees.

All of the parcels in the Study Area are classified as ECP Category 5 because of groundwater contamination, and three parcels (Parcels 2, 4, and 5) also contain CERCLA-related sites. Although release of hazardous substances has occurred in all of the parcels in the Study Area, remedial actions are being taken to address known contamination issues.

As noted in Table 14-1, several environmental issues apply to most parcels. Issues such as asbestos, PCBs, and lead (and potentially mold) would need to be uncovered through surveys and addressed before building demolition. In addition, existing hazardous substances, storage tanks, oil water separators, and existing emissions sources would need to be removed appropriately before building demolition, to avoid potential hazardous materials release or contamination. Access to groundwater monitoring sites would need to be preserved and/or moved before development of the Study Area, to be able to continue required monitoring activities.

Future development in the Study Area may require upgrades to drinking water, waste water, and storm water facilities, in addition to maintenance of groundwater treatment infrastructure. To comply with USEPA's 2010 Vapor Intrusion ROD Amendment, future development on any of the parcels in the Study Area would be required to meet the remedy related to future building construction in the Moffett Field area, including compliance with NASA's March 2005 Environmental Issues Management Plan (EIMP 2005), which includes measures to address the vapor intrusion pathway in future development in the Study Area (USEPA 2010): "Specifically, the EIMP provides design requirements for new construction, risk management procedures for future subsurface activities, and procedures for long-term management of environmental conditions in the NASA Research Park area. Specifically with regard to vapor intrusion, the EIMP requires all future construction overlying 5 ppb of VOCs in the shallow groundwater to incorporate vapor intrusion mitigation either with a sub-slab ventilation system or an indoor air mechanical ventilation system that maintains positive pressure. Additionally, after mitigation measures are implemented, the EIMP requires ongoing monitoring of contaminants and remedial measures." Future development of the Study Area would require compliance with the PEIS mitigation measures as well.

CERCLA-related and petroleum contamination sites are in Parcels 2, 4, and 5 of the Study Area. Remedial action for these sites has been under way to meet the provisions set forth in CERCLA 120(h)(3). As of 2017, monitoring results related to the MEW Superfund Site (i.e., Sites 10, 14-North, 15-North, and 16) show the treatment system is working as intended, as evidenced by a general decrease or stabilization of VOC concentration trends (Geosyntec Consultants 2018). CERCLA-related contamination levels for Site 14-South (benzene contamination) and Site 15-South (BTEX contamination) are currently unknown. Future developers who may lease land in the Study Area should coordinate with USEPA to distinguish responsible parties for continued cleanup of the CERCLA sites. The responsibility for remedial action regarding the CERCLA sites in the Study Area would remain with the Navy and NASA, to continue remediation to meet cleanup goals and CERCLA-applicable provisions.

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16. References

AECOM Technical Services, Inc. (AECOM). 2014. *Integrated Cultural Resources Management Plan*. Prepared for NASA Ames Research Center, Moffett Field, CA.

———. 2017 (February). *NASA Ames Research Center Archaeological Study*. Prepared for NASA Ames Research Center, Moffett Field, CA.

Bay Area Air Quality Management District (BAAQMD). Undated. *Synthetic Minor Operating Permit Evaluation Report*. NASA Ames Research Center, Plant Number A0550, Application Number 23438. Available: http://www.baaqmd.gov/~media/files/engineering/public-notices/2012/23438/a0550_2012-3_sm-pe-23438.pdf.

Benchmark Environmental Engineering (Benchmark). 2001a. *Asbestos Survey Report–Barricks* (ID: Building 148). Prepared for NASA Ames Research Center.

———. 2001b. *Asbestos Survey Report. Unaccompanied Housing (ID: Building 538A)*. Prepared for NASA Ames Research Center.

———. 2001c. *Asbestos Survey Report: Housing (ID: Building 583B)*. Prepared for NASA Ames Research Center.

———. 2001d. *Asbestos Survey Report: Housing (ID: Building 583C)*. Prepared for NASA Ames Research Center.

———. 2001e. *Lead-Based Paint Survey Report: Basketball Court (ID: Building 964)*. Prepared for NASA Ames Research Center.

———. 2001f. *Lead-Based Paint Survey Report: Volleyball and Horseshoe Court (ID: Building 965)*. Prepared for NASA Ames Research Center.

———. 2001g. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 148)*. Prepared for NASA Ames Research Center.

———. 2001h. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 149)*. Prepared for NASA Ames Research Center.

———. 2001i. *Lead-Based Paint Survey Report: Unaccompanied Enlisted Personnel Housing (ID: Building 583A)*. Prepared for NASA Ames Research Center.

———. 2001j. *Lead-Based Paint Survey Report: Unaccompanied Enlisted Personnel Housing (NASA) (ID: Building 583B)*. Prepared for NASA Ames Research Center.

———. 2001k. *Lead-Based Paint Survey Report: Day Care Center Unaccompanied Enlisted Personnel Housing (ID: Building 583C)*. Prepared for NASA Ames Research Center.

———. 2001l. *Lead-Based Paint Survey Report: Basketball Court (ID: Building 964)*. Prepared for NASA Ames Research Center.

- . 2001m. *Lead-Based Paint Survey Report: Volleyball and Horseshoe Court (ID: Building 965)*. Prepared for NASA Ames Research Center.
- . 2001n. *Asbestos Survey Report: Community Storage (ID: Building 82)*. Prepared for NASA Ames Research Center.
- . 2001o. *Asbestos Survey Report: Transportation Storage Facility (ID: Building 111)*. Prepared for NASA Ames Research Center.
- . 2001p. *Asbestos Survey Report: CANG Vehicle Maintenance Transportation Building (ID: Building 146)*. Prepared for NASA Ames Research Center.
- . 2001q. *Asbestos Survey Report: Gas Station Attendants Shed (ID: Building 161)*. Prepared for NASA Ames Research Center.
- . 2001r. *Lead-Based Paint Survey Report: Maintenance Storage (South Bay) (ID: Building 184)*. Prepared for NASA Ames Research Center.
- . 2001s. *Asbestos Survey Report: Public Works Shop (ID: Building 343)*. Prepared for NASA Ames Research Center.
- . 2001t. *Lead-Based Paint Survey Report: Refueling Station (ID: Building 431–432)*. Prepared for NASA Ames Research Center.
- . 2001u. *Asbestos Cover Sheet (ID: Building 459)*. Prepared for NASA Ames Research Center.
- . 2001v. *Asbestos Survey Report: Bachelors Enlisted Quarters (ID: Building 512B)*. Prepared for NASA Ames Research Center.
- . 2001w. *Asbestos Survey Report: Bachelors Enlisted Quarters (ID: Building 512C)*. Prepared for NASA Ames Research Center.
- . 2001x. *Asbestos Survey Report: Auto Hobby Shop (ID: Building 544)*. Prepared for NASA Ames Research Center.
- . 2001y. *Asbestos Survey Report: Bachelors Enlisted Quarters Boiler Room (ID: Building 547B)*. Prepared for NASA Ames Research Center.
- . 2001z. *Asbestos Survey Report: Bachelors Enlisted Quarters (ID: Building 547C)*. Prepared for NASA Ames Research Center.
- . 2001aa. *Asbestos Survey Report: Bachelors Enlisted Quarters (ID: Building 547D)*. Prepared for NASA Ames Research Center.
- . 2001ab. *Lead-Based Paint Survey Report: Racquetball Court (ID: Building 572)*. Prepared for NASA Ames Research Center.
- . 2001ac. *Lead-Based Paint Survey Report: Vehicle Washing Platform (ID: Building 585)*. Prepared for NASA Ames Research Center.

- . 2001ad. *Asbestos Survey Report: Field House (ID: Building 945)*. Prepared for NASA Ames Research Center.
- . 2001ae. *Lead-Based Paint Survey Report: HAZMAT Storage (ID: Building 950)*. Prepared for NASA Ames Research Center.
- . 2001af. *Asbestos Survey Report: HAZMAT Storage (ID: Building 951)*. Prepared for NASA Ames Research Center.
- . 2001ag. *Lead-Based Paint Survey Report: Vehicle and Battery Shed (ID: Building 958)*. Prepared for NASA Ames Research Center.
- . 2001ah. *Lead-Based Paint Survey Report: Softball Field #2 (ID: Building 966)*. Prepared for NASA Ames Research Center.
- . 2001ai. *Lead-Based Paint Survey Report: Softball Field #1 (ID: Building 967)*. Prepared for NASA Ames Research Center.
- . 2001aj. *Asbestos Survey Report: CANG Warehouse (ID: Building 992)*. Prepared for NASA Ames Research Center.
- . 2001ak. *Lead-Based Paint Survey Report: Community Storage (ID: Building 82)*. Prepared for NASA Ames Research Center.
- . 2001al. *Lead-Based Paint Survey Report: Transportation Storage Facility (ID: Building 111)*. Prepared for NASA Ames Research Center.
- . 2001am. *Lead-Based Paint Survey Report: CANG Vehicle Maintenance Building (ID: Building 146)*. Prepared for NASA Ames Research Center.
- . 2001an. *Lead-Based Paint Survey Report: Automotive Service Station (ID: Building 161)*. Prepared for NASA Ames Research Center.
- . 2001ao. *Lead-Based Paint Survey Report: Public Works Shop (ID: Building 343)*. Prepared for NASA Ames Research Center.
- . 2001ap. *Lead-Based Paint Survey Report: Recreation Storage (ID: Building 459)*. Prepared for NASA Ames Research Center.
- . 2001aq. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 512B)*. Prepared for NASA Ames Research Center.
- . 2001ar. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 512C)*. Prepared for NASA Ames Research Center.
- . 2001as. *Lead-Based Paint Survey Report: Auto Hobby Shop (ID: Building 544)*. Prepared for NASA Ames Research Center.
- . 2001at. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 547B)*. Prepared for NASA Ames Research Center.

- . 2001au. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 547C)*. Prepared for NASA Ames Research Center.
- . 2001av. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 547D)*. Prepared for NASA Ames Research Center.
- . 2001aw. *Lead-Based Paint Survey Report: Field House (ID: Building 945)*. Prepared for NASA Ames Research Center.
- . 2001ax. *Lead-Based Paint Survey Report: Hazardous Materials Storage (ID: Building 951)*. Prepared for NASA Ames Research Center.
- . 2001ay. *Lead-Based Paint Survey Report: CANG Warehouse (ID: Building 992)*. Prepared for NASA Ames Research Center.
- . 2001az. *Asbestos Survey Report: ROICC (ID: Building 107)*. Prepared for NASA Ames Research Center.
- . 2001ba. *Lead-Based Paint Survey Report: Swimming Pool (ID: Building 108)*. Prepared for NASA Ames Research Center.
- . 2001bb. *Asbestos Survey Report: Bath House (ID: Building 109)*. Prepared for NASA Ames Research Center.
- . 2001bc. *Asbestos Survey Report: Housing and Environmental (ID: Building 555)*. Prepared for NASA Ames Research Center.
- . 2001bd. *Lead-Based Paint Survey Report: Administration ROICC Building (ID: Building 107)*. Prepared for NASA Ames Research Center.
- . 2001be. *Lead-Based Paint Survey Report: Swimming Pool Dressing Rooms (ID: Building 109)*. Prepared for NASA Ames Research Center.
- . 2001bf. *Lead-Based Paint Survey Report: Family Housing Office (ID: Building 555)*. Prepared for NASA Ames Research Center.
- . 2001bg. *Asbestos Survey Report: Bachelors Enlisted Quarters (ID: Building 150)*. Prepared for NASA Ames Research Center.
- . 2001bh. *Asbestos Survey Report: Bachelors Enlisted Quarters (ID: Building 151)*. Prepared for NASA Ames Research Center.
- . 2001bi. *Asbestos Survey Report: Army Reserve Center 3 (ID: Building 153)*. Prepared for NASA Ames Research Center.
- . 2001bj. *Asbestos Survey Report: Army Reserve Center 4 (ID: Building 154)*. Prepared for NASA Ames Research Center.
- . 2001bk. *Asbestos Survey Report: Army Reserve Dormitory (ID: Building 155)*. Prepared for NASA Ames Research Center.

- . 2001bl. *Asbestos Survey Report: Army 87th EOD (ID: Building 156)*. Prepared for NASA Ames Research Center.
- . 2001bm. *Asbestos Survey Report: BBQ Pit (ID: Building 534)*. Prepared for NASA Ames Research Center.
- . 2001bn. *Asbestos Survey Report: BBQ Pit (ID: Building 534)*. Prepared for NASA Ames Research Center.
- . 2001bo. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 150)*. Prepared for NASA Ames Research Center.
- . 2001bp. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 151)*. Prepared for NASA Ames Research Center.
- . 2001bq. *Lead-Based Paint Survey Report: Army Reserve Center 3 (ID: Building 153)*. Prepared for NASA Ames Research Center.
- . 2001br. *Lead-Based Paint Survey Report: Army Reserve Center 4 (ID: Building 154)*. Prepared for NASA Ames Research Center.
- . 2001bs. *Lead-Based Paint Survey Report: Army Reserve Dormitory (ID: Building 155)*. Prepared for NASA Ames Research Center.
- . 2001bt. *Lead-Based Paint Survey Report: Army 87th EOD (ID: Building 156)*. Prepared for NASA Ames Research Center.
- . 2001bu. *Lead-Based Paint Survey Report: Main Barbeque Pit (ID: Building 534)*. Prepared for NASA Ames Research Center.
- . 2001bv. *Asbestos Survey Report: Electricity Distribution and Shelter (ID: Building 104)*. Prepared for NASA Ames Research Center.
- . 2001bw. *Asbestos Survey Report: Exchange Auto Repair Station (ID: Building 503)*. Prepared for NASA Ames Research Center.
- . 2001bx. *Asbestos Survey Report: Exchange Central (ID: Building 529)*. Prepared for NASA Ames Research Center.
- . 2001by. *Asbestos Survey Report: Exchange Retail Store (ID: Building 554)*. Prepared for NASA Ames Research Center.
- . 2001bz. *Asbestos Survey Report: Golden Bay Federal Credit Union (ID: Building 556)*. Prepared for NASA Ames Research Center.
- . 2001ca. *Asbestos Survey Report: McDonald's Restaurant (ID: Building 596)*. Prepared for NASA Ames Research Center.
- . 2001cb. *Lead-Based Paint Survey Report: Power Distribution Station (ID: Building 104)*. Prepared for NASA Ames Research Center.

- . 2001cc. *Lead-Based Paint Survey Report: Automotive Service Station (ID: Building 503)*. Prepared for NASA Ames Research Center.
- . 2001cd. *Lead-Based Paint Survey Report: Exchange Central Warehouse (ID: Building 529)*. Prepared for NASA Ames Research Center.
- . 2001ce. *Lead-Based Paint Survey Report: Exchange Retail Store (ID: Building 554)*. Prepared for NASA Ames Research Center.
- . 2001cf. *Lead-Based Paint Survey Report: Golden Bay Federal Credit Union (ID: Building 556)*. Prepared for NASA Ames Research Center.
- . 2001cg. *Lead-Based Paint Survey Report: McDonald's Restaurant Union (ID: Building 596)*. Prepared for NASA Ames Research Center.
- . 2001ch. *Asbestos Survey Report: Bachelors Enlisted Quarters (ID: Building 512)*. Prepared for NASA Ames Research Center.
- . 2001ci. *Asbestos Survey Report: Bachelors Enlisted Quarters (ID: Building 547E)*. Prepared for NASA Ames Research Center.
- . 2001cj. *Lead-Based Paint Survey Report: Oil and Tire Storage (ID: Building 574)*. Prepared for NASA Ames Research Center.
- . 2001ck. *Asbestos Survey Report: NAR Recreation Center (ID: Building 944)*. Prepared for NASA Ames Research Center.
- . 2001cl. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 512A)*. Prepared for NASA Ames Research Center.
- . 2001cm. *Lead-Based Paint Survey Report: Bachelor's Enlisted Quarters (ID: Building 547E)*. Prepared for NASA Ames Research Center.
- . 2001cn. *Lead-Based Paint Survey Report: NAR Recreation Center (ID: Building 944)*. Prepared for NASA Ames Research Center.
- . 2001co. *Asbestos Survey Report: Merchandise Exchange Offices (ID: Building 543)*. Prepared for NASA Ames Research Center.
- . 2001cp. *Lead-Based Paint Survey Report: Merchandise Exchange Offices (ID: Building 543)*. Prepared for NASA Ames Research Center.
- . 2001cq. *Asbestos Survey Report: Exchange Retail Store (ID: Building 476)*. Prepared for NASA Ames Research Center.
- . 2001cr. *Lead-Based Paint Survey Report: Moffett Exchange Store, Cafeteria (ID: Building 476)*. Prepared for NASA Ames Research Center.
- . 2001cs. *Lead Based Paint Survey Report. South Gate Information Sign (ID: Building 582)*. Prepared for NASA Ames Research Center.

- BC&I Federal Services LLC, 2014. Final Technical Memorandum, Supplemental Investigation Former Building 88 and Traffic Island Areas, Installation Restoration Site 28. Prepared for Base Realignment and Closure, San Diego, California.
- California Department of Public Health (CDPH). 2014. *Cal/OSHA Construction Safety Orders*. Lead Section 1532.1, Title 8 California Code of Regulations. Available: <https://www.cdph.ca.gov/Programs/CCDCPHP/DEODC/CLPPB/CDPH%20Document%20Library/lic.pdf>. Accessed June 27, 2018.
- CE2-Kleinfelder Joint Venture. 2015. Final Closure Report for the Former Hydraulic Lift Systems, Waste Oil Drainage Line, and Clarifier at Building 503. Former Naval Air Station Moffett Field, Mountain View, California. August 2015.
- Chemical Waste Management Inc. (CWMI). 1993a (February 1). *Draft Preliminary Site Assessment, Hangar 1, Buildings 32, 33, 83, 118, 119, 120, 347, and 584, Naval Air Station, Moffett Field, California*.
- . 1993b (May 17). *Draft Preliminary Site Assessment, Area 8, Buildings 1A, 105, 249, 256A, 329, 331, 400, Naval Air Station, Moffett Field, California*.
- . 1993c (June 1). *Phase I Environmental Site Assessment, Area 4, Buildings 77, 449, and 454, Naval Air Station, Moffett Field, California*.
- . 1993d (August 25). *Phase I Environmental Assessment, Building 567 Public Works Warehouse, Naval Air Station, Moffett Field, California*.
- . 1994 (January 12). *Naval Weapons Bunkers and Laboratory Declassification Survey, NASA Ames Research Center*.
- Chuck, Don. Chief of Environmental Management Division Work, NASA Ames Research Center. June 11, 2018a—e-mail with Anne Ferguson of AECOM regarding the presence of hazardous and biomedical wastes and potential for the presence of radon.
- . July 26, 2018b—e-mail with Anne Ferguson, AECOM regarding various EBS data questions.
- Consolidated Safety Services. 2010. *Building 343: Bathrooms*. Prepared for John Steen.
- Design, Community & Environment (DCE). 2002. *Final Programmatic Environmental Impact Statement, NASA Ames Research Center, Moffett Field, CA*.
- Earth Resources Technology (ERT). 2015a. *Environmental Resources Document, National Aeronautics and Space Administration Ames Research Center, Moffett Field, CA*.
- . 2015b. *Limited Asbestos Sampling Inspection in Building N156, Room 205 (Code DT)*. Prepared for J. Shepardson.
- . 2016a. *Building Material Asbestos and Lead Survey Report for Building 343, Drywall/Joint Compound and Vapor Barrier*. Prepared for J. Shepardson.
- . 2016b. *Oversight Report for Roof Material Removal—Building 555*. Prepared for J. Shepardson.

- . 2016c (August 24). *Asbestos and Metals Pre-demolition Bulk Sampling Report—Building 153, Paint, Flooring, Baseboard and Drywall* (Code JCM).
- . 2017a. *Asbestos Abatement Oversight Report—Building M583B, Rooms 317, 319, 322, and 324*. Prepared for J. Shephardson.
- . 2017b. *Carpet, Floor Tile, Floor Tile Mastic and Ceramic Tile and Grout Removal Oversight Report—Building 156 2nd floor* (Code JCM). Prepared for J. Shephardson.
- Geosyntec Consultants. 2018. *2017 Annual Progress Report Middlefield-Ellis-Whisman Fairchild and Regional Groundwater Remediation Programs*. Prepared for Schlumberger Technology Corporation.
- Haley & Aldrich, Inc. 2011 (September 13). *Building-Specific Air Sampling Report*.
- . 2012 (June 1). *Building-Specific Indoor Air Sampling Report, Building 154*.
- . 2016a (February). *Building-Specific Vapor Intrusion Sampling and Evaluation Report, Buildings 20, 109, 153, 156, 547B, 547D, 572, and 945*.
- . 2016b (June). *Building-Specific Vapor Intrusion Sampling and Evaluation Report, Buildings 152 and 556*.
- Harding ESE. 2001a. *Environmental Baseline Survey NASA Research Park Parcel 5*. Prepared for PAI/ISSi.
- . 2001b. *Environmental Baseline Survey NASA Research Park Parcel 2, 3, 4, 6 and 7*. Prepared for PAI/ISSi.
- ISSi – Integrated Science Solutions, Inc. 2012. *Closure Report for the Former Navy Exchange Gas Station Building 503. Former Naval Air Station Moffett Field, NASA Ames Research Center, Moffett Field, California*. January 2012.
- Long, Bob. Landscape Maintenance Staff, NASA Ames Research Center. June 6, 2018— in person discussion with David Reel of AECOM regarding pesticides use.
- Meiser, T. 2018. Cultural Resource Support Service Contractor for NASA. AECOM. October 30, 2018—Telephone call with Trina Meiser of AECOM regarding archaeological sensitivity in the Study Area.
- National Aeronautics and Space Administration (NASA). 2003 (September). *NASA Ames Research Center Storm Water Pollution Prevention Plan*.
- . 2005 (March 1). *Environmental Issues Management Plan – NASA Research Park*.
- . 2015 (February 24). *NPR 8800.15C. Real Estate Management Program*.
- . 2017a (March 31). *Hazardous Material Information for Building 153*.
- . 2017b (April 2). *Hazardous Material Information for Building 156*.

- . 2017c (December 15). *Hazardous Materials and Wastes Inventory Matrix Report for Building 109*.
- . 2018a (March 19). *Hazardous Materials Spreadsheet for Building 184*.
- . 2018b (February 22). *Hazardous Materials Spreadsheet for Building 950*.
- . 2018c (June 18). *Spill Prevention Control and Countermeasures Plan, Facilities Storing Oil Drums*.
- . 2018d (June 18). *Spill Prevention Control and Countermeasures Plan—Qualified Oil-Filled Electrical Equipment*.
- . 2018e (June). *Spill Prevention Control and Countermeasures Plan, Volume III: Bloom Energy SPCC*.
- National Guard Bureau. 2009 (August). *Final Environmental Baseline Survey for the 129th Rescue Wing Long-Term Property Lease and Property Release at Moffett Field*. Prepared for California Air National Guard at Moffett Field.
- Naval Air Station, Moffett Field, Public Works Environmental Division (NAS Moffett Field). 1993 (November). *Draft PCB Survey, Naval Air Station, Moffett Field, California*.
- PAI. 2003 (December 3). *Asbestos Abatement Inspection Services for 583C Roofing Mastic Abatement Project*.
- PAI/ISSi. 2000. *Closure Plan, Buildings 111, 146, 161, 574, 958, and 992*. Prepared for NASA Ames Research Center.
- . 2003 (January 28). *Lead Impacted Soil Sampling and Removal Action Workplan Implementation Initial Soil Sample Results*. NASA Research Park, Moffett Field, California. Letter to Mr. Thomas Anderson.
- PRC Environmental Management, Inc. (PRC). 1994 (March). *Base Realignment and Closure Cleanup Plan, Naval Air Station, Moffett Field*.
- Regional Water Quality Control Board (RWQCB). 2003. *Transmittal of Closure Letter and Site Summary for Underground Storage Tank 57, Moffett Federal Airfield, California*. Case No. 43D9012. Prepared for BRAC Operations.
- . 2006 (April 19). *Transmittal of Closure Letter and Site Summary for Underground Storage Tanks Listed Below, Moffett Federal Airfield, Santa Clara County, UST Numbers: 21, 29, 76, 89, and 115*.
- . 2013. *No Further Action for Former Underground Storage Tank 58, Former Naval Air Station, Moffett Field, Santa Clara County*. Prepared for BRAC Program Management Office.
- Santa Clara Valley Water District (SCVWD). 2010. *Revised Final Groundwater Vulnerability Study, Santa Clara County, California*. Prepared by Todd Engineers and Kennedy/Jenks Consultants.

- SEC Donahue, Inc. 1993 (February 12). *Preliminary Site Assessment NAS Moffett Field, Buildings 146 and 146A, Santa Clara County, California.*
- State Water Resources Control Board (SWRCB). 2017. *Division of Water Quality GAMA Program Groundwater Information Sheet, Trichloroethylene (TCE).*
- Tetra Tech EM Inc. (Tetra Tech). 1994 (January). *Baseline Environmental Report for Naval Air Station, Moffett Field, California.* Administrative Draft.
- . 1998. *Final Basewide Petroleum Site Evaluation Methodology Technical Memorandum.*
- Turner, Garrett Michael. Restoration Program Manager, Environmental Management Division, NASA Ames Research Center. July 10, 2018a—e-mail to Anne Ferguson, AECOM, regarding drinking water and waste water facilities.
- . July 11, 2018b—e-mail to Anne Ferguson, AECOM, regarding storm water.
- . June 7, 2018c—e-mail to Max Schad, Santa Clara County District Attorney's Office, regarding NASA Ames storm water discharge into the Northern Channel.
- Trulio, Dr. Lynne. 2001. Burrowing Owl Habitat Management Plan. March 2001.
- U.S. Department of Defense (DoD). 1995. *Base Realignment and Closure Cleanup Guidebook.*
- U.S. Environmental Protection Agency (USEPA). 1989. Fairchild, Intel, and Raytheon Sites – Middlefield/Ellis/Whisman (MEW) Study Area, Mountain View, California. *Record of Decision.* Region IX.
- . 2010 (August 16). *Record of Decision Amendment for the Vapor Intrusion Pathway.* MEW Superfund Site Study Area. Region 9.
- . 2018 (March 22). *Lead-Based Paint Program Frequent Questions.* Available: https://www.epa.gov/sites/production/files/2018-03/documents/full_rrp_fqs_march_22_2018.pdf. Accessed June 27, 2018.
- U.S. Geological Survey (USGS). 2018. *Mineral Resources On-Line Spatial Data.* Available: <https://mrdata.usgs.gov/general/map.html>. Accessed June 19, 2018.
- Uribe and Associates. 1993 (April). *Report of Findings Phase I Building Assessments, Area 2, Buildings 10 and 543.* Contract No. ARC860805.
- Vermeere, Bill. PAI/ISSi, Radiological Specialist. 2000. Personal communication - telephone. Conversation regarding radioactive materials. May 23.



Appendix A

Photos of Buildings by Parcel

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Parcel 1



Building 148



Building 149

Parcel 1



Building 150



Building 151

Parcel 1



Building 380



Building 583A

Parcel 1



Building 583B



Building 583C

Parcel 2



Building 082



Building 111

Parcel 2



Building 146

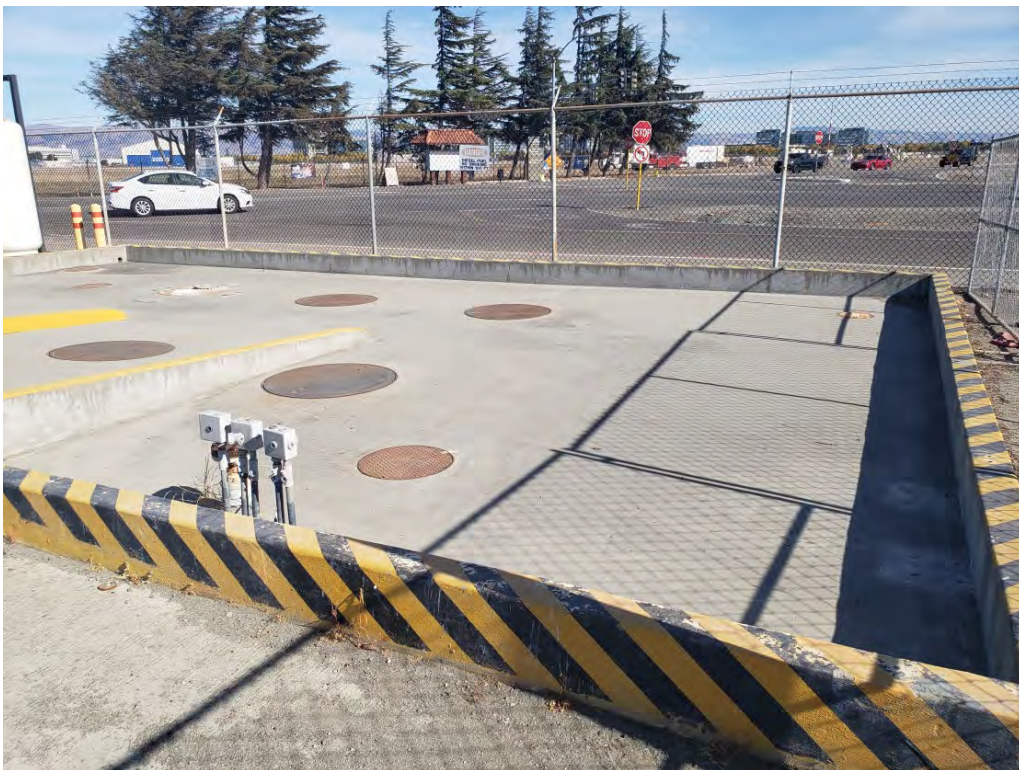


Building 161

Parcel 2



Building 184



Building 432

Parcel 2



Building 459



Building 512A

Parcel 2



Building 512B



Building 512C

Parcel 2



Building 544



Building 547B

Parcel 2



Building 547C



Building 547D

Parcel 2



Building 572



Building 574

Parcel 2



Building 585



Building 945

Parcel 2



Buildings 950 and 951



Building 958

Parcel 2



Building 966



Building 967

Parcel 2



Building 992

Parcel 3



Building 107



Buildings 108

Parcel 3



Building 109



Building 555

Parcel 4



Building 152



Building 153

Parcel 4



Building 154



Building 155

Parcel 4



Building 156



Building 533

Parcel 4



Building 534



Building 590

Parcel 4



Building 964



Building 965

Parcel 5



Building 104



Building 503

Parcel 5



Building 526



Building 529

Parcel 5



Building 547E



Building 554

Parcel 5



Building 556



Building 596

Parcel 5



Building 944

Parcel 6



Building 543

Parcel 6a



Building 476

Parcel 10



Building 431



Building 582

Parcel 11



Building MF1025A